

RAILROAD GAZETTE

FRIDAY, JAN. 30.

CONTENTS.

ILLUSTRATIONS :	PAGE.	
Union Car Coupler.....	74	
Six-Wheel Coupled Freight Engine, Lancashire & Yorkshire Railway.....	75	
Wright's Compound Locomotive.....	76	
Grinder for Chilled Car Wheels	77	
Standard Trestles, Atlantic & Pacific R. R.,.....	78	
Self-Feeding Circular Saws.....	79	
CONTRIBUTIONS:		
The Coupler Contour.....	73	
EDITORIALS:		
Financial Prospects for 1891,.....	80	
Can Railroad Men Know Too Much?.....	81	
How Can Strikers be Punished?.....	81	
December Accidents.....	81	
EDITORIAL NOTES.....		80-82
GENERAL NEWS :		85
Locomotive Building.....	85	
Car Building.....	85	
Bridge Building.....	85	
Meetings and Announcements.....	86	
Personal.....	86	
Elections and Appointments.....	86	
Railroad Construction.....	87	
General Railroad News.....	88	
Traffic.....	88	
MISCELLANEOUS :		89
Technical.....	89	
Railroad Law.....	89	
The Scrap Heap.....	89	
Railroading in Central America.....	89	
Safety Appliances in Michigan.....	89	
Car Service, New York Railroad Club.....	89	
Not s on the Abrasion and Endurance of Rails.....	89	
New York Railroad Commissioners' Report.....	89	
Train Accidents in the United States in December.....	89	

Contributions.

The Coupler Contour.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I have been carefully over the paper on vertical plane couplers read by Mr. D. L. Barnes before the Western Railway Club last month, and have been very much interested therein. The point to which I wish especially to call attention is the wearing of the inner face of knuckles. The diagrams herewith will explain my points. If the inner faces of the knuckles were cut away at *A A*, fig. 1, so that the points of the knuckles at *B B* could be relieved from bearing at these points, the inner

faces of the knuckles would wear straight across instead of wearing, as is shown in fig. 2, on the dotted line *D E*. I claim that the knuckles wear off on the line *D E* because the point *B* comes in contact at *A*, which results in crowding the knuckles apart, as shown in fig. 2. Fig. 2 is supposed to show the knuckle before being put in service, and fig. 1 after having been worn.

I would like to say regarding malleable iron heads that our experience with the "Buckeye" coupler on several hundred cars is that we have not had one of them break as yet, and we have tested them as high as 118,000 lbs., which they withstood successfully.

JAS. TIMMS.

Railroading in Central America.

Each of the five Central American Republics has one or more railroads in operation and an unlimited number on paper. Money enough has been spent or rather money enough has been raised to give Central America all the mileage necessary for some years to come. The United States is not the only country where the "promoter" thrives. Every other "gringo" you meet carries a concession in his pocket. He is either just going to Europe, or has just returned, and expects the agent of the syndicate on the next steamer. When I first went to Spanish America I spent many a weary day wandering aimlessly around the Plaza smoking cornshuck cigarettes and waiting for the "next steamer." I know better now. My advice to railroad men who wish to try Central America is to wait patiently for the "next remittance from the syndicate" just as long as your salary goes on; when that is stopped, rustle for another place.

Construction has various difficulties to contend with besides an occasional lack of funds. Labor is scarce and not particularly good. The Indians are, as a rule, strong and hardy, but they don't take kindly to 10 hours a day. They are accustomed to task work, and are through by 9 o'clock in the morning. Although one must, on railroad work, pay double what is paid elsewhere, it is not appreciated. All an Indian wants is a quarter to get drunk with on a feast day. Any more money is a burden to him. On the haciendas and coffee fincas the laborer is kept in debt, and consequently he is content. If you let an Indian have the \$10 or \$15 coming to him at the end of the month, you will never see him again. The

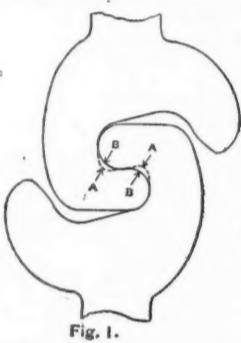


Fig. 1.

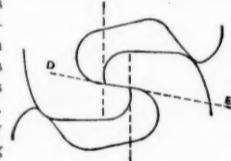


Fig. 2.

mountain Indians are by far the best workers, but take them to the coast, and they soon get down with the fever. Take the coast Indians to the uplands, and they will tell you it is too cold to work. In the coffee season you will be obliged to raise wages.

Crowbars are largely used in place of picks. The natives like bars. I have stood on the edge of a cut many a time and watched a gang of men, every one of them with their bars firmly set in the earth and their hands sliding up and down without moving the bar as though they were working for dear life. Time is no object; as soon as you learn this you will get along better and cease to grow thin and gray-haired. It is amusing to watch a new man from the "States." He comes out with a reputation to make and a determination to get a move on things. He succeeds in making everybody uncomfortable in the first place, and in getting himself disliked. He will probably object to the foremen taking breakfast in bed, and, like as not, intimate that a three hours' nooning is not the way to build a railroad. He will thankfully accept the proffered services of various Anglo-Saxons who have lived long enough in the country to thoroughly understand the language, the customs of the people, etc., and he will find that they understand them so well that they object to work. In short, he will worry himself into a fever, and either go home a wreck or recover, and, being acclimated, discover that he has yet something to learn about railroading. One must not let physical or political earthquakes distract his equanimity, although they may interfere with the work. Draw your salary as often as possible and remain absolutely ignorant of politics. This last point will be more easily accomplished than the first.

Grading in itself is no more difficult than in the United States. The earth is generally dark loam, and there is very little clay or hardpan. The rock is softer, and in many places there is not enough for building purposes. Large sections of the country are covered with a layer of volcanic ashes, which may be any depth. This is mean stuff to handle. Powder has no effect on it, and dynamite is not much better. A good laborer will pick two yards a day of this material. It needs no slope, but will stand perfectly straight. On construction, the Indians dig caves in the sides of cuts of this material to sleep in. The rainy season, which begins in May and lasts well into October, is, of course, a serious drawback to construction, but you can work if you give your Indians sleeping accommodations (in the dry season it is not necessary). When it begins to rain, the Indians strip, put their clothes in their straw hats and continue work. There is not much scraper work, for nine-tenths of the country is covered with heavy forests. The soil is deep and the roots go down. There is no better animal in the world for a slush scraper than the rather undersized Spanish mule. He will do more work, stand more wear and tear and eat less than our American mules.

Portable cars and track—from Germany—can be obtained in Central America as cheap as in the United States. With these one can let a good deal of piece-work and get double the labor out of his men than he could working them by the day. When getting a concession, be sure and have a clause admitting material and supplies duty free. Another thing about getting a concession: Don't be too particular about the subsidy—the amount per mile. If the road should happen to be completed during your lifetime you will have done your share. Let some one else wrestle with the subsidy.

The only railroad in Central America that has yet been completed to its objective point is the Guatemala Central. You have had several articles describing this road in the last few years. It extends from the port of San José to Guatemala City. The original Guatemala Central was built by Gen. Nanne, formerly General Manager of the Costa Rica Railroad, and reached from San José to Escuintla, a distance of 30 miles. This part was completed in 1880. It was not a difficult road to build, Escuintla being only 700 ft. above sea level. The line from Escuintla to the capital, a distance of 41 miles, was built by the Central American & Pacific Railway & Transportation Co.—C. P. Huntington and associates—and completed in 1884. Huntington, of course, absorbed the old road, and they are now under one management.

The line from Escuintla to Palin has been changed recently. The original line had a 4½ per cent. grade and was a miserable location. It crossed seven barrancas on wooden trestles, from 200 ft. to 300 ft. long, and from 100 ft. to 150 ft. in height. Several of these bridges had an 80-ft. span. They were built of Oregon pine. But no wood will last in that climate. Ties will not last a year and telegraph poles rot off in six months. This company got a shipload of redwood ties from California, but they answered but little better. I have pulled out spikes with my fingers from ties that had been in use but 18 months. The only wooden ties that I have seen in the tropics that would last any length of time were on the Panama Railroad. They were made of lignum-vite. I have seen caps taken out of the above mentioned bridges that were mere shells. They looked all right, but one could put his foot clear through them. The entire inside was eaten out by some insect, the name of which I have forgotten. The company first started to fill these barrancas. In barranca No. 1 they laid a culvert of cement pipe (we call them California fruit jars). There were fifteen of these pipes, each 2 ft.

in diameter, laid up in the form of a triangle. They had gotten about 30,000 yards of embankment on top of these pipes, when there came a shower, and the next morning there was not a vestige of culvert or embankment left. Several years after, while down the coast on a hunting trip, I found a piece of one of these "fruit jars" embedded in a sand bar at the mouth of the Michatoya River, fully forty miles away. A peculiarity of these barrancas is the fact that they are biggest at the upper end. One would naturally expect a ravine to grow larger as it nears its mouth, but in these the opposite is the case. I explain it in this way: The barrancas are on the slope of the Vulcan de Aqua (water volcano), and when the volcano was forced up through the crust of the earth it was like putting your fist through a pie crust—the cracks would be largest near the fist. The new line crosses these ravines lower down, without bridges, and has a maximum grade of 3 per cent. Above Palin the line runs through fertile valleys filled with coffee and sugar plantations, and crosses the lake of Amatitlan on a fill 600 ft. long and 60 ft. high. Considerable uneasiness was felt at first as to whether this fill would stand the frequent shocks of earthquake that are so prevalent around that lake; but the fill is intact up to date, although some 200 ft. slid off during construction.

The Northern Railroad is the most important road ever begun in Guatemala. It is to extend from Santa Tomas (Puerto Barrios) on the Gulf of Amatique to the capital, a distance of 182 miles, thus making, by connection with the Central, a transcontinental road. I am unable to state just who put the scheme through, but I know several "promoters" who made a living out of it. The road was to be built by the government, and the contract was let to Shay, Cornick & Co. for \$11,000,000, which included construction and equipment. Gen. Gordon, of Georgia, was also interested in this road. Money was raised to begin construction by the issue of government bonds, and a law was passed obliging the people to take them in proportion to their wealth. Some four miles of track were laid through the swamp back of Puerto Barrios, and grading was well under way for 60 miles, when President Barrios issued his famous proclamation, declaring himself "Military Dictator" of the five Central American Republics, and started out with 15,000 troops to back his judgment. There was at this time about \$100,000 to the credit of the railroad with which to continue construction, but this went, it is said, to pay the troops, and as a matter of course work stopped. Barrios was killed and the road lost its most powerful friend. The next question with the small army of engineers, foremen, etc., was how to get out of the country. Some of them, not knowing the customs of the country, were foolish enough to wait for their pay. The white laborers, many of whom had been Shanghaied in New Orleans, were taken off by an American man-of-war.

A Mr. Anderson, of the firm of Anderson & Owen, of Livingston, afterward got a concession to continue the construction of this road, and went to Europe to raise the money, but failed to materialize. A French syndicate is reported to have been ready to loan the government \$21,000,000 gold, with which to complete this road, purchase the Central and establish banks, etc., but the late war between Guatemala and San Salvador has in all probability put an end to such negotiations.

The Champerico & Northern Railroad runs from the Port of Champerico to the town of Retaluleu, about 28 miles. Several surveys have been made to the city of Quezaltenango (8,000 ft. above sea level). Surveys have also been made to the Costa Rica, a rich coffee district. This road was built with California capital and has recently been purchased by the government. The Guatemala Central contemplates building a branch from Amatitlan to Antigua, the centre of another coffee district.

In Spanish Honduras, the only road in operation is the Honduras Railroad. This road was completed from Puerto Cortez to San Pedro Sula, a distance of 69 miles, but at the present time it is only operated to St. Jago, 37 miles from Puerto Cortez. The concession for this road was from ocean to ocean. It cost the English bondholders \$30,000,000, and about all they had to show for it at the time it was sold to Col. William Snyder was a right of way and two streaks of rust. It is said that steamships would not receive bananas that had been hauled over this road.

The Honduras Central Railroad is projected from Truxillo to Jutecalpo, 200 miles, and thence to La Union, on the Gulf of Fonseca. The concession is owned by a New York syndicate. The Honduras North Coast Railway & Improvement Co. has a line projected from Truxillo to Puerto Cortez, a distance of 150 miles, with power to extend to the boundary of Guatemala. Construction was begun on this road in 1885. It carries a land grant of one million acres. The Truxillo & Roman River Railroad is projected up the Arenal Valley. There are quite a number of railroad projects carried around in individual pockets that can be bought cheap. I remember one enterprising individual who insisted that Birmingham (Alabama) should have an outlet. He was going to build a double track road clear across Honduras, which, he said, would relieve Birmingham immensely. Quite a number of people, who neglected to wire the commandant of the port, sincerely mourn his departure.

I do not think Honduras needs many railroads at present. Our American plan of building railroads first and developing the country afterwards will hardly do in Central America under the existing state of affairs.

San Salvador has a line in operation between the Port of Acajutla and the city of Sonsonate, and the track is laid some distance beyond the latter place toward the city of Salvador. The government has a line projected from the port of La Libertad to the capital. The San Salvador Central Railroad is projected from La Union to the boundary of Guatemala. This concession has been sold several times, and is now owned by C. P. Huntington. It carries a subsidy of \$10,000 per mile, and guarantees net earnings of \$1,000 per mile. There is a tramway between the cities of San Salvador and Santa Tecla, nine miles in length, which was built by the government, and is now owned by Francisco Camacho, of Guatemala.

In Nicaragua there is a line from the Port of Corinto to Monotombo on Lake Managua and another piece from the city of Managua to Granada, on Lake Nicaragua. This line is owned by the government. The canal company has several miles of track down, on the line of the canal from Greytown.

In Costa Rica the Costa Rica Railway is about completed. This line runs from Port Limon, on the Atlantic, via San José, the capital, to Punta Arenas, on the Pacific. Three pieces of this line—one on each coast and one at San José—have been in operation quite a number of years. Construction has been suspended and resumed several times, but I think this time they will complete it. It has been a difficult road to build and they have had hard luck in the way of washouts in addition to the various impediments to construction common in these countries.

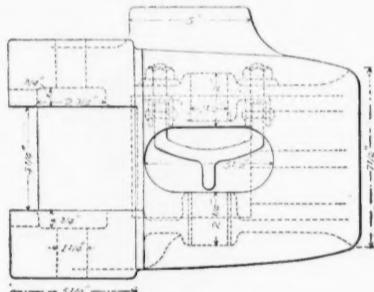
The Central American Republics are in favor of government railroads, and most lines are built with an option of government purchase, or revert to the government after a term of years.

It is to be regretted that these governments cannot settle their little political differences without the use of the bayonet. An election practically means the counting of bayonets in the place of votes. But then there is an excuse for this; the treasuries are empty and they cannot use dollars as more enlightened countries do. In my humble opinion, Central America is about the finest country on the face of the globe, and it only needs a more stable government, combined with a little Anglo-Saxon push, to prove the truth of this assertion.

F. W. CONN, C. E.

The Union Car Coupler.

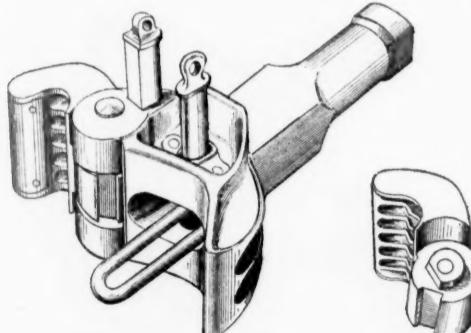
The Union Coupler Company, of Philadelphia, Pa., has recently brought out the coupler which is illustrated here. It has been subjected to very thorough tests and 1,000 couplers are now in service. It is made on the



Front Elevation of Head.

Master Car Builders' lines. The drawbar is malleable iron and the knuckle and pins are of steel.

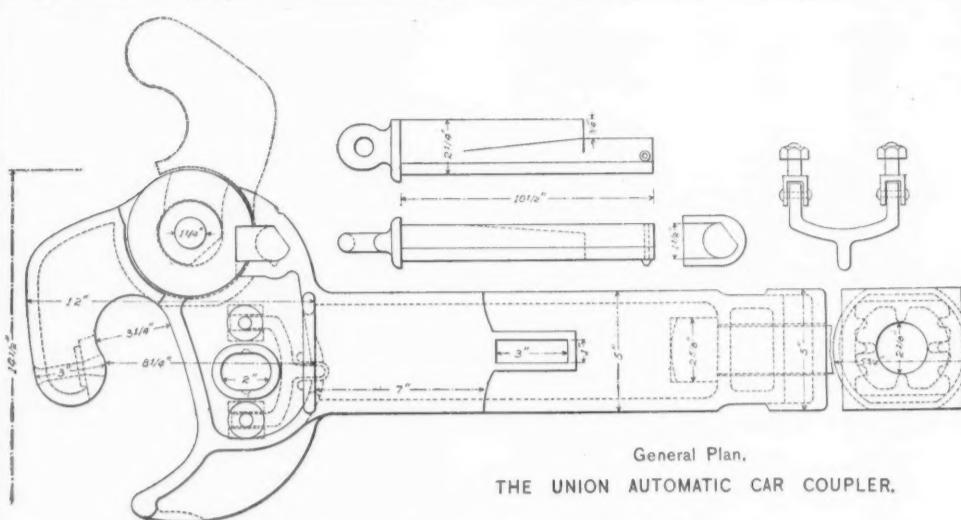
The knuckle has several peculiar features. One is the use of a wearing plate of hard steel, which it is said can be produced at a cost of 35 cents. This is shown in the



Set to Couple with Link.

Knuckle.

engravings. It will be seen further that owing to the device for coupling with link the knuckle is without a slot or pin hole, and therefore will be relieved from the principal present source of breakages. It has no shank, the locking slot being cut in the hub of the knuckle as shown. The knuckle also has a shoulder to take the buffing strains and a flange for the pulling strains, thus re-



General Plan.

THE UNION AUTOMATIC CAR COUPLER.

Wheels, cast steel; crank axles, steel:

Diameter of tread	60 $\frac{1}{4}$ in.
" " bearings	7 $\frac{1}{2}$ in.
Length of bearings	9 in.
Diameter of crank bearings	7 $\frac{1}{2}$ in.
Length " "	4 $\frac{1}{2}$ in.

Axes, leading and trailing, steel:

Diameter at wheel seats	8 $\frac{1}{2}$ in.
" " bearings	7 $\frac{1}{2}$ in.

Length, bearings	9 in.
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Frames, steel:

Thickness of frame	1 in.
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Boiler, steel:

Height from rail to centre line of boiler	7.7 in.
Diameter of outside of smallest barrel plate	50 in.

Thickness of plates	1 $\frac{1}{2}$ in.
" smoke box tube plate	2 $\frac{1}{2}$ in.

Pitch of rivets	1 $\frac{1}{4}$ in. full
All rivet holes drilled	1 $\frac{1}{2}$ in.

Thickness of throat plate	5 $\frac{1}{2}$ in.
" sides and top plate	5 $\frac{1}{2}$ in.

" back plate	5 $\frac{1}{2}$ in.
Pitch of copper stays	4 in.

Diameter	1 $\frac{1}{2}$ in.
Roof stays (cast steel)	5 $\frac{1}{2}$ in.

Copper fire box:

Length of bottom inside	64 $\frac{1}{2}$ in.
Breadth inside	42 in.

Tubes:

Copper	290
Length between tube plates	10 ft. 9 $\frac{1}{2}$ in.

Diameter outside	13 $\frac{1}{4}$ in.
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Thickness, 10 and 12 l. W. G.	1 $\frac{1}{2}$ in.
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Heating surface:

Tubes	1102.26 sq. ft.
Fire box	107.68

Total	1299.94 sq. ft.
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Grate area	18 $\frac{1}{4}$ sq. ft.
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Working pressure	190 lbs. per sq. in.
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Weight of engine empty	85,420 lbs.
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Weight of engine, working order	94,380 lbs.
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Safety Appliances in Michigan.

The annual report of the Railroad Commissioner of Michigan, summarized in the *Railroad Gazette* of Jan. 23, is accompanied by a report of Mr. C. B. Conger, the mechanical engineer who acts under the authority of the Commissioner. This report is devoted chiefly to power brakes and automatic couplers, and a list is printed showing the number of locomotives with air pumps and with driven brakes, and the number of cars with M. C. B. couplers in use on each road in the state. Three small roads use the non-automatic vacuum brake, but one of these, the Cincinnati, Wabash & Michigan, is changing its equipment to automatic pressure brakes. Of the 1,700 locomotives used in the state, about 900 have air pumps and 1,000 driver brakes. The roads operating in the state have 8,000 freight cars equipped with M.C. B. couplers and 4,600 with air brakes; but two of these roads, the Chicago & Northwestern and the Lake Shore & Michigan Southern, of course report the total number of cars owned, a large share of which must be used outside of Michigan. The engineer criticises the foundation brake rigging on some of the cars used in the state, and calls attention to the small percentage of brake power on some passenger trains. Some of the short passenger trains require from 50 to 100 per cent. more distance to stop in than would be required if the proper leverage required by the state was insisted upon.

Continuous steam heating is used to some extent on the Michigan Central, Detroit, Lansing & Northern, Chicago & West Michigan, Grand Rapids & Indiana, Cincinnati, Wabash & Michigan, Milwaukee & Northern, Chicago & Northwestern, Lake Shore & Michigan Southern and Chicago & Grand Trunk. The trouble-some defects of coupling and piping outside the cars, which will be remedied only by experience, are regarded as now the only serious obstacles to the success of continuous systems. There have been no bridge accidents in the state, nor have any bridges been condemned by the department during the year. The law requiring frogs and guard rails to be blocked is much better observed than heretofore. A number of train order signals are fixed in such a low position that they are not visible from an engine over a box car standing on the side track (between the signal and the main track), and the risk involved in such a practice is pointed out. At-

mentioned—that is, absence of a slot and pin hole in the knuckle and of a shank, and the method of coupling with the link and pin. There is no strain on the knuckle when using a link and pin, as it is thrown around out of the way. It is also claimed that a coupling can be made on a sharper curve than with any other coupler, and while moving at very low or high speeds.

Six-Wheel Coupled Freight Engine—Lancashire & Yorkshire Railway.

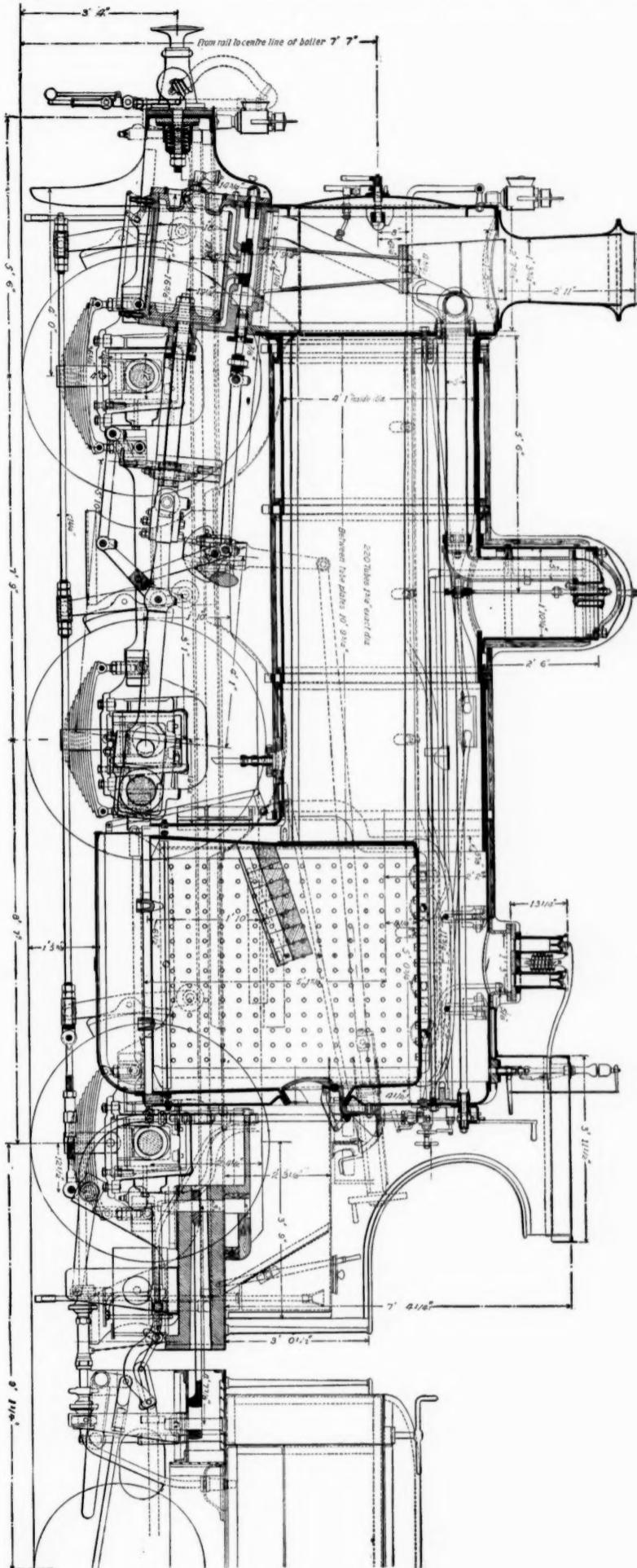
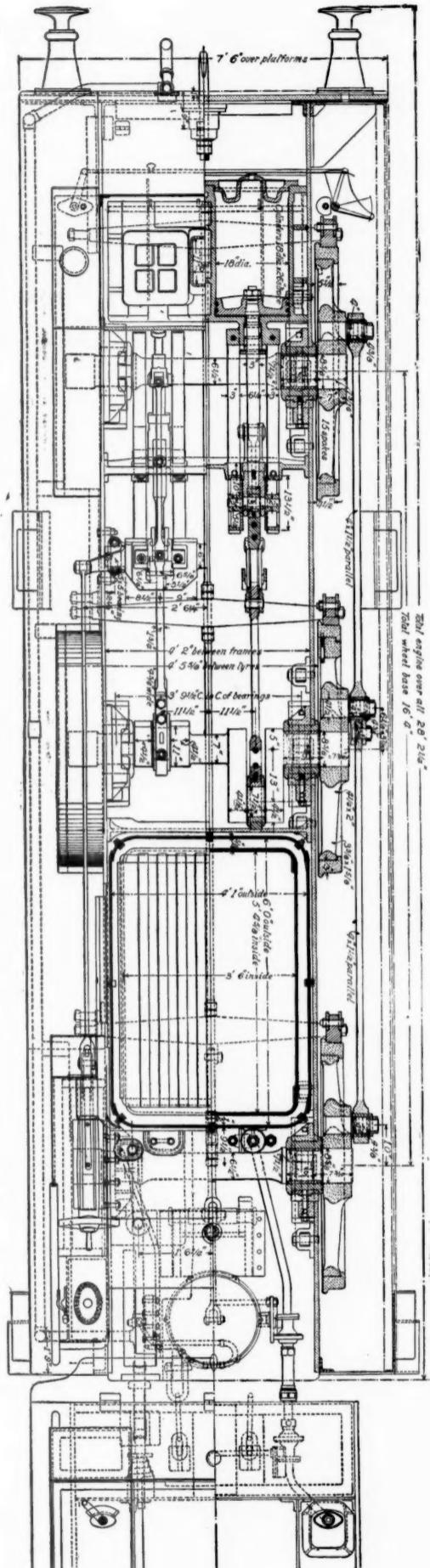
We illustrate herewith a design of a six-wheel coupled freight engine for the Lancashire & Yorkshire Railway Co., of England. These locomotives were built at the Horwich shops of that company, which we have frequently referred to. They are from the designs of Mr. John A. F. Aspinall, Chief Mechanical Engineer, and are peculiar in that they were designed to be built at the least possible expense consistent with good operation and workmanship. The object has been to make the engines of that road duplicate in such a way that as many as possible of the same parts can be used for all.

In operation these locomotives have proved to be eminently satisfactory, and having been built at what is undoubtedly the largest, most complete and modern locomotive shop in the world, they should be of interest to all railroad men.

The completeness of the shops will be appreciated when it is known that nearly all of the parts of the engines are made there, including the driving tires, the cast steel wheels, the injectors, and many parts which in this country are purchased from outside manufacturers. The drawings are complete, and show clearly their general design, while the following table of dimensions will give further detailed information:

Cylinders:	
Diameter of cylinders	18 in.
Stroke of piston	26 in.
Length of port	12 $\frac{1}{2}$ in.
Width of steam port	19 $\frac{1}{2}$ in.
" exhaust port	3 $\frac{1}{2}$ in.
Distance from centre line of cylinder to valve face	12 $\frac{1}{2}$ in.
Lap of slide valve	1 in.
Maximum travel of slide valve	4 $\frac{1}{2}$ in. full.
Lead of slide valve	1 $\frac{1}{2}$ in.
Distance between centres and centre of cylinders	23 in.
Diameter of piston rod	3 in.
Length connecting rods between centres	6 ft. 2 in.

SIX-WHEEL COUPLED FREIGHT ENGINE—LANCASHIRE & YORKSHIRE RAILWAY.



tention is called to the fact that some switch targets are painted the same color as the background which is visible to an approaching engineer. Concerning interlocking Mr. Conger says:

There are 60 interlocking machines at work at present and five more in process of construction. About all of them are kept in good order; a few that were not very well put in are giving out and require constant repairs. The cable and wire machines give the most trouble on account of the difficulty of keeping the cable the right length at all times. There is a demand for a better class of machines and a more rigid inspection of them than when first put in. As far as my observation goes the companies using these machines are satisfied that a

cheap machine is the dearest in the end. I have inspected all these machines at intervals and have also been furnished monthly reports of their condition by the officials in charge of them.

Car Service.

What follows is an abstract of the discussion in the New York Railroad Club of Mr. Wattson's paper on Car Service at the meeting of January 15. The paper was published in full in our last issue.

Mr. PROUT: It would be of interest if Mr. Wattson would tell us a few facts about the degree of success that the Car Service Associations have had through the country. My understanding was that in the territory

where they have operated they have decreased the detentions of cars very materially, and new ones are being formed all the time. Although that is not as comprehensive or final a settlement as he proposes, still it is a help, pending the fruition of the big scheme.

Mr. WATSON: It is a question of statistics as to results accomplished by the several car service associations which I have not carried accurately in my head. I know though that the statistics which have been collected showing the general movement of cars throughout the country during the first quarter of last year, as compared with the first quarter of the two years previous, show that the general daily average performance of cars is not any greater now than it was before the first Car Service Association was organized. I do not know why this should be so, because the separate re-

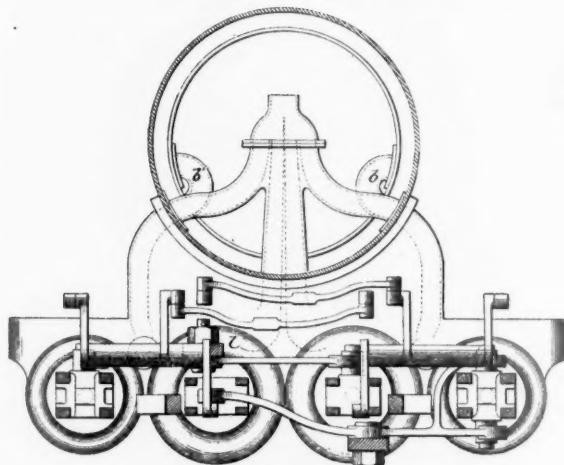


Fig. 1.

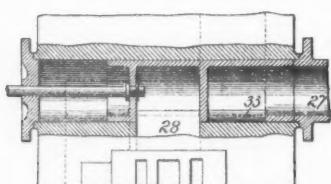


Fig. 3.

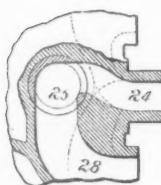


Fig. 4.

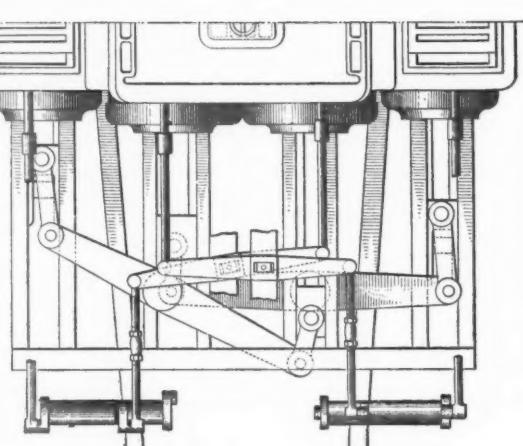


Fig. 2.

WRIGHT'S COMPOUND LOCOMOTIVE.

ports of the different associations show that the detention of the cars in the territory over which they have control has been decreased in most instances at least 50 per cent. The car service plan seems to get the cars released unloaded, but as soon as a car is unloaded the association is through with it, and whether the railroad company moves the empty cars any more promptly than it did before is a matter of which we have no statistics to determine. But at any rate there are only about 25 of these associations in the country, and they hardly cover enough cars to affect the general movement throughout the country. What is needed is a system that will cause an empty car to be moved and sent home to its owner after it has been unloaded, to be worked in conjunction with the car service associations. The best plan is generally thought to be a per diem charge to be paid by the railroad companies to each other for the use of cars interchanged. Consignees unload cars promptly because if they do not they are charged one dollar per car per day. Now, if we can get the same principle to work among the railway companies and have them pay about 25 cents for every day they hold somebody else's car after it is empty, we might have a general improvement in the movement of cars.

The CHAIRMAN: It seems to me that an average of only two hours car service per day is not very much.

Mr. WATTSON: The statistics collected by the General Time Convention and those collected by the Car Accountants' Association, covering different periods, show the same results; that the performance amounts to from 17 to 25 miles per day. If the cars are moved in fast freight trains which run about 25 miles an hour the cars would be in motion only one hour of each day, but I have taken the basis of a local freight, 12 miles per hour.

Mr. PROUT: I was told the other day that the Wabash road has 7,000 cars east of Suspension Bridge. That made a pretty big hole in their complement of cars. I don't know whether Mr. Wattson's road was responsible for some of them or not; but it is a point which illustrates the tremendous importance of the subject which Mr. Wattson has brought out.

Mr. WATTSON: This is not only a car service question, but it is a motive power question, because, as Mr. Prout says, if the Wabash has 7,000 cars east of the Suspension Bridge, probably 5,000 of them are lying around on different railroads, loaded, in the vicinity of New York simply because the shippers in the West have been sending their products into this market faster than consignees are ready to receive them. The railroad companies have been forced to move from Buffalo or from Chicago to New York as much tonnage in the last three months as they will probably move in the following five months; in consequence, we must have nearly twice as much motive power during this rush season as we do during the dull season. If the shipments could be regulated so that consignees would take care of them promptly on arrival we could get along with a great deal less motive power. The consignor or shipper puts his wheat into a car, gets his bill of lading, and he has his storage and insurance paid for. It is a great deal nicer arrangement than if he were to put it into an elevator and pay his own insurance and storage. The railroads take care of it for him until he can find somebody down here in New York who is ready to take it off his hands. That is the reason why the Wabash has 7,000 cars lying around east of the Niagara River.

Mr. PROUT: Down at the bottom of this is the fundamental necessity that the railroads have to get freight to carry. They have no reason for being, if they do not have traffic to handle; and one way to get this is to have a large surplus of cars which they send out West and allow them to lie there a month or, say, waiting for the wheat to be ready to move, and the man who has his cars on hand is the one who gets the wheat. I don't know whether it is a necessity to secure traffic in that way, but that is the way they do it.

Mr. WATTSON: You have hit the reason why the per diem system as heretofore proposed has not been adopted, because some of the railroad companies have more cars than others and they use them as missionary agents. A little road out West has 500 or 600 cars of stuff to send into New York. Some eastern road finds out a month ahead, and sends 500 cars out there and fills up all the side-track room, so that no other company can get any cars in and the business is, to use a significant term, "coppered." Another feature, which is becoming a very perplexing one, is the building of private cars. Nearly every shipper of any importance is getting to building his own cars, and he insists that the railroad company shall haul his freight cheap and pay him for the use of his cars. This practice during dull seasons keeps cars belonging to the railroad companies from performing their legitimate service. If we could throw the equipments all into a stock company, as proposed, the question of private cars and supplying of cars for missionary purposes would be solved, and this is the only way suggested to my mind that it could be done.

Mr. PROUT: Wouldn't it, after all, result in decreased accommodation to the public if the cars were controlled by one great corporation? They certainly would not have the incentive to get the cars out and put

them where the public could use them, that they would if they were scrambling for competitive business?

Mr. WATTSON: There would be no reason why the equipment companies should not have abundant cars to take care of the business. Of course, there would have to be storage yards at the large business centres, like Buffalo, Chicago, St. Paul, where cars not needed for use in the respective territories could find a home when empty. For instance, if we had a storage yard in New Jersey, all the cars that were not needed by the various Jersey roads could be sent into that yard, and while they were there they could be repaired, painted and fixed up; and as the different companies needed cars they would order them from the equipment company, and the orders would be filled from the storage yard. In this way the supply could be regulated to a nicety. The equipment companies would be bound under penalties to furnish sufficient cars to meet the requirements; but, with 1,000,000 of cars now on hand the question of insufficient supply would be very remote, with a proper system of distribution in operation.

Mr. PROUT: The railroad company would simply have to pay for the cars that it took and sent off on a scout.

Mr. WATTSON: Yes, the railroad companies would be paying a per diem charge as long as they had the cars. When they did not need them they would send them to the storage yards, and the cars would there be subject to the call of any railroad that needed them.

Mr. ROBERT: I would ask Mr. Wattson if there is not a great deal of equipment covered by mortgage and a great deal covered by trusts. How would you get around that difficulty?

Mr. WATTSON: A mortgage can always be paid off, can it not?

Mr. ROBERT: No, not until it is due. A car trust can not be paid off until it is due.

Mr. WATTSON: They could be handled on the same principle as private cars, and be thrown into the equipment companies.

Mr. ROBERT: But you know a great many railroad mortgages are drawn not only to cover the roadbed, the stations and real estate, but covering the personal property, covering the cars, covering the locomotives as well. Now the railroad company cannot give a title to that property until it is relieved from the weight of the mortgage.

Mr. WATTSON: That matter could be very easily regulated. These cars that are operated by different railroads through car trusts or that have mortgaged liens on them, could be used by the railroads for their local service. The plan which I propose is for cars used in the interchange of business throughout the country. In operating the equipment company it would be one of the main objects to build cars of one standard and to have them equipped with appliances of one type, so that wherever they go there would be the same heights and dimensions, drawbars, brakes, etc.

Mr. ROBERT: I am not sufficiently familiar with the subject to be able to say whether the cars under mortgage are more than sufficient for local service or not, but I think almost all the rolling stock of the companies has a lien on it, with the exception, perhaps, of the main traffic lines or the old established lines like the New York & New Haven and the trunk lines to the West.

Mr. DALE: In forming a company of the magnitude that is spoken of wouldn't it be a good business idea to suggest that a company of such magnitude should at least take up the bonds or car trusts and guarantee for instance a certain percentage, or guarantee the interest, and in that way absorb the whole?

Mr. ROBERT: Of course it could be done by the company until it could get a clear title to the cars. Here is a car trust concern that has put out, say, one hundred cars, and the title to those cars stands in them. Post, Martin & Co. do a great deal of that business; they build 100 cars and sell them for a certain per cent. down. They do not part with the title; they hold it. The cars are owned by Post, Martin & Co. until the last payment is made on them. Post, Martin & Co. have their contract, and on that contract they issue trust certificates of \$1,000 each, bearing 6 per cent. interest. Perhaps they are sometimes sold for less than par, but they do not pass over the title until all is paid. They cannot pass over the titles of those \$1,000 certificates to any new equipment company. They would be guilty of fraud if they did. I could have them arrested. They have to hold the title until all is paid, and then they will pay me my share. Before they could pass over the title to a new company they would have to go around to every one holding these certificates and get them to sign off. And in the case of a mortgage it would be the same way. They would have to get every bond holder and even then they would get into complications, because many of them would be in the hands of executors and trustees who had no right to transfer.

Mr. DALE: If this company is formed, wouldn't it be policy from a business standpoint for these people to come into it?

Mr. ROBERT: Yes, I think it might be. But as a practical question they might not be able to do it.

Mr. WATTSON: I would like to ask for information, if these car trust certificates are not limited in time; because car property is rather visionary.

Mr. ROBERT: They run about five years, I think, generally.

Mr. WATTSON: I thought they must have a limit, as a car only lasts about ten years.

Mr. ROBERT: Yes, but there are a great many going out all the time; more going out than being taken in, I think.

Wright's Compound Locomotive.

A compound locomotive has been patented by Mr. R. C. Wright, who was for a long time connected with the Baldwin Locomotive Works, and afterward Superintendent of the Rhode Island Locomotive Works. He has been identified with locomotive construction for many years. The arrangement of this compound system is shown in figs. 1, 2, 3 and 4, a description of which is as follows: Two high and two low pressure cylinders are arranged on each side of the engine, the two low pressure being placed inside of the frames and the two high pressure outside of the frames, as shown in fig. 1. Each cylinder is provided with a set of guides and cross-head, as shown in fig. 2. To avoid crank shafts, levers are used, which reach from the inside cylinders to the outside cylinders, as shown in fig. 2. These levers are supported by transoms across the frames at or near the centre of their length. To one end of each of these levers is attached the cross head of a low pressure cylinder by means of a link. The other end is connected by a link with the cross-head of the high pressure cylinder. In this way the power of the low pressure cylinders is transmitted to the cross-head of the high pressure cylinders. There are, therefore, two sets of connecting rods for the four cylinders. The general features of this construction are clearly shown in figs. 1 and 2.

Figs. 3 and 4 show the compounding valves, of which there are two each, placed between a high and low pressure cylinder in a cylindrical seat formed in the cylinder saddle. This cylindrical seat or bore reaches entirely through the saddle, and is covered by a cap on the back end, and by an exhaust pipe on the front end, as shown. Each seat has three openings: one marked 28 from the exhaust port of the high pressure cylinder, another marked 24, which is the exhaust pipe of the high pressure cylinder when working non-compound, and a third, which opens in and through the exhaust pipe 27; this last being the exhaust pipe of the high pressure cylinders when working compound. The compounding valves are hollow cylinders, each having two partitions, so placed that the distance between them is equal to the width of the opening 28 from the exhaust port of the high pressure cylinder, and also equal to the openings of the exhaust pipes 24. Through the cylindrical shell of the compounding valves there are openings to the passage 28 and exhaust pipe 24 exactly opposite to them. Between the partitions these openings form a free and unobstructed passage from the passage 28 through the compounding valve to the exhaust pipe 24, so that when the valve is placed in the position described the high pressure cylinders exhaust directly into the open air through the exhaust pipe 24 to the exhaust nozzle.

The compounding valves also have another opening, 33, just forward of the partition, corresponding in size to the opening of the passage 28 from the exhaust port of the high pressure cylinders, and when the valve is drawn back to place the opening 33 is opposite the passage 28, the passage to the exhaust pipe 24 is closed, and the high pressure cylinders will exhaust into the compounding valve through its open end into the pipe 27, and into the receiver to which the pipe 27 leads, thus exhausting the high pressure cylinder into the receiver where the steam is stored for use in the low pressure cylinder. The passage to the low pressure cylinders is afforded by the pipes b and b', fig. 1. Each compounding valve has a stem which passes through the cap on the end of the valve chamber and is connected to a rod running to the cab within easy reach of the engineer, so that by moving the valve to the proper position the locomotive works as a simple high pressure engine or as a compound, as desired. The exhaust receiver is formed

in the regular smoke box extension by a ring secured by rivets to the front of the box, the smoke box sheet forming the outside of the receiver, and the inner ring the inside of the receiver.

Grinder for Chilled Car Wheels.

We illustrate a new grinding machine for trueing chilled car and truck wheels, manufactured by the Springfield Emery Wheel Manufacturing Company, of Bridgeport, Conn.

The machine consists of a heavy bed plate, set even with the floor, upon which a pair of headstocks are firmly secured, one at each end. Each of the headstocks is provided with three spindles, working one inside of the other and simultaneously revolved by a bottom shaft, running through and having bearings on the bed plate. The inner spindles carrying the centres support the wheels while being ground. They are adjustable to any length of axle by hand wheels at the back of the heads. The intermediate spindles carry gear wheels giving motion to both inner and outer spindles. The outer spindles carrying the clamping heads are horizontally adjustable by extra large hand wheels, located at the middle of each head. The heads are provided with three arms, each having radially adjustable yielding contact points, which, being forced against the wheels by means of the large hand wheels, takes a grip against the under or inner side of the wheel rims to drive them. The contact points are made of tool steel, shaped in two edges, and they suit themselves to any diameter of wheel or to any irregularities in the shape or metal of the wheels. They are made adjustable to the wheels

re-enforcement is of importance under compressive stresses as it is under tensile. A much higher stress may be sustained locally when the part directly loaded is reinforced by a larger area of metal immediately beyond than could be applied to the entire cross section of a bar of uniform section. In estimating the resistance per square inch this feature should be duly considered.

Considering the transverse resistance of a rail, the strength will depend upon the form and dimensions of its cross section and the strength of the metal of which it is composed. The transverse stiffness within the elastic limit of the metal will depend upon the form and dimensions, but will not be sensibly affected by the other qualities of the metal employed. The modulus of elasticity on which the stiffness depends is a very persistent feature in steels and is not materially changed by a wide range in chemical composition. Hence, so far as stiffness is concerned, it will be immaterial whether the rail is made of mild or of hard steel; the deflection will be the same in either case under the same load. The harder metal will naturally have a higher elastic limit and capable of receiving a higher load without taking a permanent set, and therefore can deflect farther than the mild rail and recover when the load is removed.

Furthermore, it is shown by experiment that the modulus of elasticity is substantially the same in tension as in compression. This being the case, a rail will deflect the same amount in opposite directions. That is to say, the rail will deflect the same under a given load, whether the head or base is uppermost or very nearly the same. A slight difference in the behavior of the metal in the base, if the base is broad and thin, might cause a slight

load than the original overstraining stress? The observance of overstrained metal suggests these queries, which are not the result merely of an effort of the imagination.

If time effaces early injurious effects we are left in somewhat of a dilemma, whether to regard this result as a disposition on the part of the metal to eventually go to pieces in response to very low stresses, or on the other hand recognize in this effect elementary proof of the existence of internal forces which will tend toward giving permanence to the structure. We are inclined to adopt the latter view.

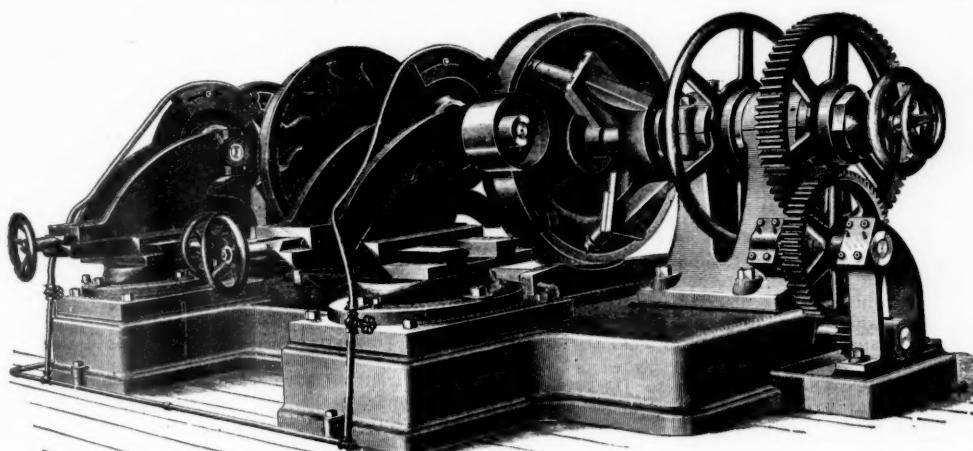
If the effects of severe overstrains are not soon effaced by time, then possibly new rails may be laid which on account of overstraining in the usual process of straightening after rolling are in a more or less disturbed state. If straightening is done cold, we see no reason why it should be different in its effects than an overload due to the weight of an engine or any other similar cause.

Let us define what must be done in order to straighten a bent rail. First a transverse load is applied sufficient to bend the rail beyond a straight line, and give the metal such a permanent set that when it recovers upon release of the load its final condition shall be straight. Assuming the metal to be in a state free from internal strains at the commencement, then when a transverse load is applied the metal on one side down to the neutral axis will be under compressive stress, on the other side it will be under tensile stress, and if the elastic limit is not exceeded the metal will spring back into the position it before occupied when the load is released, the strains having disappeared. If, however, a permanent set has been given which is necessary to effect straightening, the metal will spring back a certain amount as before, but not to its original position, and now instead of the internal strains disappearing upon release of the stress they will continue to exist. The outside fibres will be the first which are overstrained and take a permanent set. The metal each side and next the neutral axis will not have been overstrained and will therefore continue to exert a tendency to recover to its original position, but is prevented from so doing by the outside metal which received the permanent set. The result of such action will therefore be to leave the rail in this state as regards the presence of internal strains. The metal on the outside of the bend will be left in a state of internal compression; then will come metal in a state of tension, till we reach the neutral axis, then metal under compression, and finally metal under tension at the inside of the bend.

We see from this that the outside metal will really work under the opposite kinds of stresses to those which we are accustomed to consider as acting on the convex and concave sides respectively of a bent beam, and this state of affairs will continue for all stresses acting in the same direction and in magnitude below those which were used in effecting the straightening, provided no radical change occurs in the state of the outside metal. The magnitude of the internal strains which are left from the process of straightening will depend upon the elastic limit of the metal. If there was no elastic limit to the metal then obviously there would be no opportunity for the introduction of internal strains in this manner.

A comprehensive series of tests upon different grades of steels at higher temperatures made at the Watertown Arsenal has shown that the elastic limit diminishes with increase of temperature, but at moderate temperatures, say from 400 to 600 degrees F., that overstraining may cause a decided elevation in the elastic limit when the metal has cooled again to atmospheric temperature. If the overloading is done at higher heats, say after the metal is red hot, or above 1,000 to 1,200 degrees F., such effect was not noticeable. From this behavior we should infer that while straightening of a slight degree might be done under lower loads, and as the temperature of the rail was increased internal strains of lesser magnitude introduced, although it would still be possible to introduce large internal strains at moderate temperatures, that on the whole straightening would be more successfully done in proportion as the temperature was raised. In the so-called critical temperature or blue-heat there was observed a tendency to fail in an oblique shearing direction and with small contraction of area, but beyond this no unusual phenomena were noted in this zone of temperature. Considering the problem of rail straightening in the light of all the data developed by this series of temperature tests, we are not encouraged to believe that internal strains may be avoided unless straightening is done at red heats, at a time when the metal is plastic and without sensible elastic limit. This is the only conclusion which appears consistent with observed facts. If, as before stated, there is a molecular change going on slowly, whereby certain effects may in time be effaced, our conclusions would need to be modified accordingly; but upon this point we are at present without sufficient data. Annealing at high temperatures will remove internal strains which were introduced at other, lower, temperatures, but methods which might be adopted with pieces of metal of small size would be impracticable in the case of rails.

In this as well as in many other features of railway engineering a grave responsibility rests upon those who use rails to institute thorough examinations of the material, in order to remove the obscurity which surrounds many important questions.



GRINDER FOR CHILLED CAR WHEELS.

Made by the SPRINGFIELD EMERY WHEEL MANUFACTURING CO., Bridgeport, Conn.

independent of the centre spindles which carry the axle.

The inner spindles are adjustable longitudinally to suit extreme or medium lengths of axles, and to bring the wheel faces into position for grinding. The grip of the contact points upon the rims of the wheels serves to impart to them a steady, reliable and unyielding revolution without vibration, trembling or jar.

To one side of the bed plates are attached the brackets or heads carrying the grinding wheels, and provided with the usual arrangement of slide ways for regulating the cut.

A short track is placed immediately under the car wheels while being ground, and provision is made for drawing and lifting the wheels and axle up to position to be taken hold of by the inner supporting spindles. When the centres of the inner spindles are in place to support the wheels and axle, the tracks are lowered out of the way and the wheels will swing free, ready for adjustment and grinding. By such attached drawing and lifting appliance the operator is enabled to change wheels and axles in from three to four minutes.

To furnish a free supply of water for the grinding, a tank is formed at the base of the machine, whence it is taken by centrifugal pump and piping to the wheel faces, valves being provided for regulating the flow. To prevent the water from flying off at a tangent, an adjustable hood is placed over each wheel to receive the water and guide it down to the tank again for further use.

The machine will grind from six to eight pairs of new wheels or from five to seven pairs of old wheels in ten hours, at a total cost of from 24 to 28 cents per wheel, including labor, cost of emery wheels, oil and all other items of expense. Experiment and experience have clearly demonstrated that wheels running true and smooth on their faces are capable of giving a greater mileage, hence the advisability of grinding them true and smooth instead of leaving them as coming from the chill.

Notes on the Abrasion and Endurance of Rails.

BY JAMES E. HOWARD.

II.

Unsoundness of metal is of course detrimental, as lateral support is lost thereby. The question of lateral

difference in the relative stiffness, according to which part was uppermost. For a rail of given sectional area its stiffness will also depend upon the disposition of the metal with reference to its neutral axis, or, in other words, the moment of inertia of its cross section will be an index of its stiffness. The last remark needs to be qualified in this manner: If the metal was continuous from the neutral axis to the outside fibres, then the moment of inertia would strictly be an index of relative stiffness; but in the case of a rail the portions of the flanges remote from the web do not act precisely as they would if the metal was continuous, but allow of slightly increased deflection. With this exception we know of no reason why the moment of inertia does not correctly indicate relative stiffness.

As regards ultimate resistance, the quality of the metal is important, and the ability to display greater or less toughness will modify the maximum resistance.

The metal in the web and base commonly possesses greater strength than the head, owing no doubt to the greater amount of mechanical work done on the thin parts and to differences in temperature during hot workings. Just how this variation in strength of the several parts affects the rail when subjected to moderate overstraining or excessive loads once applied, or the same repeated, has not been experimentally demonstrated. Direct experiments are also required to show the relative effects of overstraining, according to which part of the rail is on the tension or compression side of the bend, as regards the total amount of deflection which will be given.

As before stated, metal may be eventually ruptured by the repetition of stresses which exceed the elastic limit, or are between that limit and its tensile strength, as those values are determined from the ordinary tensile test. A number of important questions present themselves in this connection. If, for example, a certain load long continued, or many times repeated, will finally end in rupture of the metal, does the first application inaugurate a series of phenomena, which are augmented in their effects as further loadings are made, and will this initial effect remain a permanent injury, or at an early stage can the metal recuperate from such deleterious effect? Furthermore, is it to be expected that an excessive load once applied will leave the metal in condition to be further injuriously affected by a lower

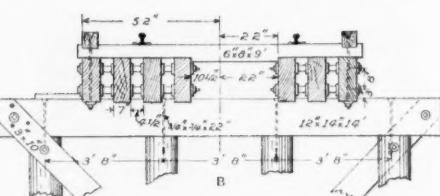
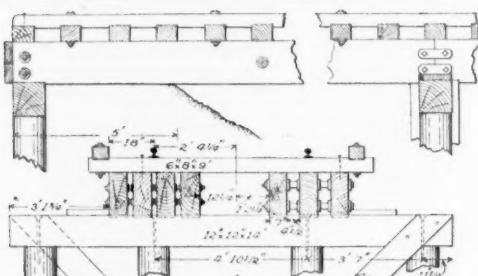
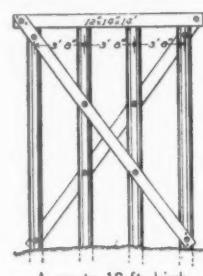
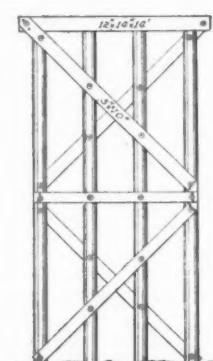
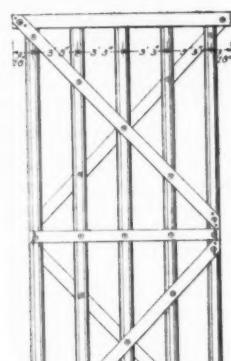


Fig. 1.—Details of Floor Systems.



A, up to 18 ft. high.

B, 19 to 26 ft. high.
Fig. 2.—Pile Bents.

C, 27 to 32 ft. high.

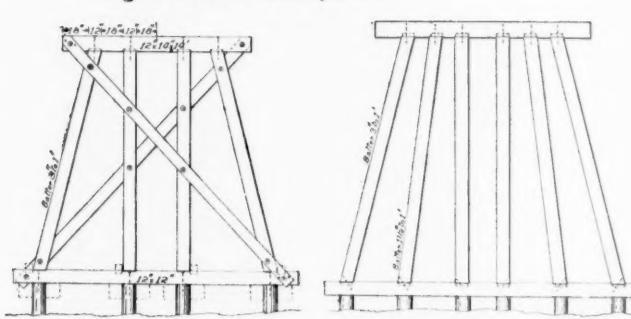


Fig. 3.—Framed Bents.

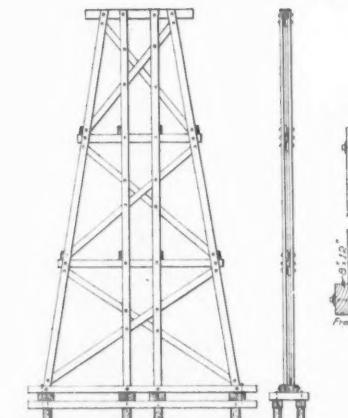


Fig. 4.—40 to 90 ft. high.

STANDARD TRESTLES—ATLANTIC & PACIFIC RAILROAD.

Concerning the effects of shocks and suddenly applied stresses certain experiments have indicated that high rates of speed, merely considered as rapidly applied loads, would not be detrimental in their effects provided the elastic limit of the metal was not exceeded. Loads have been applied at the rate of 45 times per second without interfering with the elastic deflections of a rotating shaft.

In a rotating shaft the effect of the load is shown by the amount of deflection produced, and while high speeds of rotation did not cause appreciable change when the loads were confined within the elastic limit, yet when they exceeded that limit there was less deflection than when slowly rotated. In the latter case the molecular friction of flow appeared to act in conjunction with the cohesive forces in resisting distortion, and this internal friction rapidly heats the metal, and with the heating of the metal come a train of attendant phenomena, such as the lowering of the elastic limit and of the modulus of elasticity, and a tendency, if loss of heat was prevented, to go on heating and reaching high temperatures.

It might be possible to conceive of a stress within the elastic limit so rapidly applied that the metal would rupture before responding to its effects in the usual manner by deflecting, extending or compressing, as the case might be; but any such limitation of speed has not yet been experienced with rapidly applied loads.

In this connection we are led to reflect upon the prevailing opinion concerning a tendency to develop brittle fractures in cold weather, no adequate explanation for which seems to have been offered. The Watertown Arsenal tests have not yet been directed toward the solution of this question, hence we have little original information to offer. However, tensile tests made at zero temperature do not show any material change in ductility, and the strength is then really a little higher than at ordinary summer temperatures. There is commonly shown a gradual loss in tensile strength in passing from zero to about 200 degrees F. Above 200 degrees the strength increases for a time, and afterward diminishes with further increase of temperature until fusion occurs.

There are instances of brittle fractures which were caused apparently by the presence of intense internal strains which perhaps concentrated upon some portion of the metal where there was a want of continuity and where consequently the metal would be in an unfavorable condition to develop ductility. Failure to display ductility, in a naturally ductile metal, might be due to a stress locally applied with such suddenness that the part receiving the load would be torn from the adjacent parts before there was time for the transmission of the stress to the other parts or the form might be unfavorable by reason of abrupt changes in dimensions; but it has not come to notice where by direct experiment with rapidly applied loads that brittleness of fracture has been accomplished, although brittleness has been experimentally shown in bars having sharp angles, where a fracture would commence at such an angle and extend until rupture was complete. Under such conditions ad-

ditional data will be necessary to show whether lowering the temperature will modify the behavior of the metal in a manner which may be detected or not. Instances are on record where otherwise ductile steel has failed in a brittle manner when subjected to bending stresses after the edges of the sheets had been sheared and that annealing had corrected this tendency. There was no evidence of rupture having actually begun, and we should certainly not expect simple annealing to restore any cohesive force, if such was actually lost. So far as our evidence reaches, the annealing merely released some of the internal stresses and the original ductility of the metal reappeared. From such experience we might naturally expect brittle fractures possible or even probable where internal strains had been introduced by the operation of punching holes in the webs or flanges of rails. It yet remains to be shown that reduction in temperature without other disturbing cause will increase the natural tendency which exists at normal temperatures. External and independent causes may contribute to this end in winter months. The state of the roadbed, for example, may be responsible in a measure. But it is also claimed that not only do rails display a tendency toward brittleness of fracture, but other material which can hardly receive any influence from the condition of the roadbed as the case is with drawbars.

It must be confessed that this branch of the subject is in a very unsatisfactory condition at present, and, considering the importance, it is to be lamented that such is the case.

The coefficient of expansion by heat appears to diminish in steels as the amount of carbon increases.

Hence, rails which are hard chemically considered, when carbon is the hardening element, will expand and contract less due to changes of temperature than softer rails.

It has been found that hardening by sudden quenching from a high temperature will change the rate of expansion, and when thus hardened the coefficient will be higher than the normal value.

This again shows us wherein a want of homogeneity in the metal may exist, and the possible presence of a detrimental influence in controlling ductility.

In considering the transverse stresses one is impressed with the fact that so little information exists directly obtained by examination of the actual behavior of the rails in the track. Resting upon a bed of soil varying in character, ties of hard or soft wood, of different dimensions and distances apart, the ties supported by ballasting differing in resistance and elastic properties, all these elements introduce conditions of a complicated nature which may best be studied by observing the rails in actual service. It is of course improper to regard the rails as resting upon rigid points of support and compute the stresses according to that assumption. The distance between the two nearest edges of two adjacent ties is therefore not the distance to be used as though the ties themselves did not yield and throw some of the load on remote ties. For some distance in each direction from the wheel is the weight supported, and how much it is thus distributed we may best learn by direct observations on the track itself.

Wooden Trestle Bridges.*

BY WOLCOTT C. FOSTER.

STANDARD TRESTLE PLANS, ATLANTIC & PACIFIC RAILROAD.

The accompanying cuts illustrate the standard trestle plans as adopted on the Atlantic & Pacific Railroad, Mr. Samuel M. Rowe, Resident Engineer. On this road a very convenient method of getting out these standard drawings and their accompanying descriptions and directions is followed. The plans are made to come within a space of 6 in. \times 7 $\frac{1}{2}$ in. The blue prints are made and bound up into books or pamphlets of 9 in. \times 10 in. The specifications for timber are also blue printed and included in the pamphlet.

Fig. 1 shows the different floor systems. The left-hand side of each of these cuts gives the details of four piece stringer bridges, while the right-hand side gives those of three piece stringer bridges.

Three stringer pieces are used when the timber is Oregon pine, four when it is native pine. The track, in the systems shown at A, is kept in line by 10-in. spikes driven through the ties. This is with a view to allow it to be relined without moving the stringers, which if done to any great extent destroys the symmetry of the bridge. The guard rails are notched and bolted to every third tie. It will be noticed that the stringers are held in place by blocks spiked to the cap.

The caps, which are of 12-in. \times 14-in. timber, 14 ft. long, are drift bolted, either to the piles or posts, as the case may be.

Fig. 2 gives the details of pile bents, figs. 3 and 4 of framed bents. The bent, fig. 2, A, is employed on tangents and on curves of 6 deg. and under up to a height of 18 ft.; fig. 2, B, on tangents and curves of 6 deg. or less for heights from 19 ft. to 26 ft. For greater heights up to 32 ft. on tangents, and for curves of 3 deg. to 10 deg. on heights between 16 ft. and 28 ft., the bent shown at fig. 2, C, is used.

In framed trestles, the bent fig. 3, A, is used up to 30 ft. in height to base of rail by putting in a horizontal sway brace, and having two sets of diagonal sway braces when height is above 16 ft. In this case, the longitudinal bracing shown as resting on the sill must also be employed. By combining this bent with a well braced pile bent 12 ft. high a trestle 42 ft. high may be built. When the bents rest upon sub-sills, the blocks, 12 in. \times 12 in. \times 4 ft. to 6 ft., are arranged in pairs for heights up to 16 ft. Above this height the blocks are placed in groups of four. Where the trestle is subjected to great lateral pressure from floods and drift wood, the bent fig. 3, B, is used.

In all of the framed bents the mortises are very shallow. The notches in the caps are 1 in. deep and the mortises 2 in.; in the sill the notches are $1\frac{1}{2}$ in. deep and the mortises 2 in. They are all re-enforced by drift bolts.

Fig. 4 shows the bent used for trestles of 40 ft. to 90

* Copyright, 1890, by W. C. Foster, and condensed from his forthcoming book upon the same subject.

ft. height on tangents and 60 ft. to 30 ft. on 3 to 10 degree curves.

The dimensions of the iron details are shown in fig. 5.

On this road the elevation of the outer rail on curves is accomplished by shortening the piles or posts on one side, thus inclining the cap.

Following are bills of material:

FLOOR SYSTEMS.

Four-piece Stringer, Fig. 1, B—Timber.

Name.	No. of pieces.	Size.
Guard rails.	2	6 in. x 6 in. x 16 ft.
Ties.	10	6 in. x 8 in. x 9 ft.
Stringers.	8	7 in. x 15 in. x 15 ft.
Blocks.	2	2 in. x 10 in. x 18 in.

Four-piece Stringer, Fig. 1, B—Iron.

NAME.	No. of pieces.	Size.	Weight lbs.		Use.
			Each	Total	
Bolts.	10	3/4 in. x 46 in.	5.75	57.50	Stringer p'cs together.
"	6	3/4 in. x 30 in.	3.75	22.50	Guard rails.
Splice plates.	8	1 1/2 in. x 4 in. x 10 in.	3.7	29.60	Stringer j'ts.
Spikes, boat.	4	3/4 in. x 3/8 in. x 7 in.	0.31	1.25	
" cut.	8	20 penny.	0.132	1.10	
Cast iron spools.	30	3/4 in. hole, 4 in. x 4 1/2 in.	5.5	165.00	Separators.
" washers	16	1 in. hole, 3/4 in. x 1 1/4 in.	1.375	22.00	Under bolt heads and nuts.

Three-piece Stringer, Fig. 1, B—Timber.

Name.	No. of pieces.	Sizes.
Guard rails.	2	6 in. x 6 in. x 16 ft.
Ties.	10	6 in. x 8 in. x 9 ft.
Stringers.	3 (two bays)	7 in. x 16 in. x 30 ft.
Blocks.	2	2 in. x 10 in. x 18 in.

Three-piece Stringer, Fig. 1, B—Iron.

NAME.	No. of pieces.	Size.	Weight lbs.		Use.
			Each	Total	
Bolts.	10	3/4 in. x 34 in.	4.25	42.50	Stringer p'cs together.
"	6	3/4 in. x 30 in.	3.75	22.50	Guard r. l's.
Splice plates.	4	1 1/2 in. x 4 in. x 10 in.	3.7	14.80	Stringer j's.
Cast iron spools.	20	3/4 in. hole, 4 in. x 4 1/2 in.	5.5	110.00	Separators.
" washers	24	1 in. hole, 3/4 in. x 4 1/2 in.	1.375		
Spikes, boat.	4	3/8 in. x 3/8 in. x 7 in.	0.31	1.25	
" cut.	8	20 penny.	0.132	1.10	

The bills of materials for floor systems, fig. 1, A, are the same as the foregoing, except as to the length of guard rail bolts and the lining spikes.

PILE BENTS.

Timber.

Name.	No. of pieces.	Size.
Fig. 2, A.	1	12 in. x 14 in. x 14 ft.
Cap.	2	3 in. x 10 in. x - ft.
Sway braces.	4	12 in. diam. x - + 12 ft. (penetration).

Fig. 2, B.

Name.	No. of pieces.	Size.
Cap.	1	12 in. x 14 in. x 14 ft.
Sway braces, diagonal.	4	3 in. x 10 in. x - ft.
" horizontal.	2	3 in. x 10 in. x 12 ft.

Piles.

Name.	No. of pieces.	Size.
Fig. 2, C.	4	12 in. diam. x - + 12 ft. (penetration).

Fig. 2, C.

Name.	No. of pieces.	Size.
Cap.	1	12 in. x 14 in. x 16 ft.
Sway braces, diagonal.	4	3 in. x 10 in. x - ft.

" horizontal.

Name.	No. of pieces.	Size.
Piles.	5	12 in. diam. x - + 12 ft. (penetration).

PILE BENTS.

Iron.

Name.	No. of pieces.	Size.
Fig. 2, A.	4	3/4 in. x 3/4 in. x 22 in.
Boat spikes.	8	3/8 in. x 3/8 in. x 7 in.
Bolts.	10	3/4 in. x 29 in.
Cast iron washers.	20	3/4 in. x 4 1/4 in.

Fig. 2, B.

Name.	No. of pieces.	Size.
Drift bolts.	4	3/4 in. x 3/4 in. x 22 in.
Boat spikes.	24	3/8 in. x 3/8 in. x 7 in.

Bolts.

Name.	No. of pieces.	Size.
Cast iron washers.	44	3/4 in. x 4 1/4 in.

Fig. 2, C.

Name.	No. of pieces.	Size.
Drift bolts.	5	3/4 in. x 3/4 in. x 22 in.
Boat spikes.	24	3/8 in. x 3/8 in. x 7 in.

Bolts.

Name.	No. of pieces.	Size.
Cast iron washers.	54	3/4 in. x 4 1/4 in.

FRAMED BENTS.

Timber.

Name.	No. of pieces.	Size.
Cap.	1	12 in. x 14 in. x 14 ft.
Posts, plumb.	2	12 in. x 12 in. x - ft.
" batter.	2	12 in. x 12 in. x - ft.

Sill.

Name.	No. of pieces.	Size.
Sill.	1	12 in. x 12 in. x - ft.

Sway braces.

Name.	No. of pieces.	Size.
Sill.	2	3 in. x 10 in. x - ft.

Foundations.

Name.	No. of pieces.	Size.
Piles.	4	12 in. diam. x - ft.

Subsills.

Name.	No. of pieces.	Size.
For heights above 16 ft. add.	8 to 16	12 in. x 12 in. x 4 ft. to 6 ft.

Sway braces, diagonal.

Name.	No. of pieces.	Size.
" horizontal.	2	3 in. x 10 in. x - ft.

Longitudinal braces.

Name.	No. of pieces.	Size.
Longitudinal braces.	4	6 in. x 8 in. x - ft.

Figs. 3, 4.

Name.	No. of pieces.	Size.
Cap.	1	12 in. x 14 in. x 15 ft. 9 in.

Posts.

Name.	No. of pieces.	Size.
Posts.	6	12 in. x 12 in. x - ft.

Sill.

Name.	No. of pieces.	Size.

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Published Every Friday,
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EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns our own opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

Mr. Barnes' paper on air brakes and vertical plane couplers was discussed at the meeting of the Western Railway Club last week, but the discussion has not been issued for publication, and we are not, therefore, at liberty to present some interesting facts which were brought out. A contemporary has, however, made some curious criticisms regarding the statements in the body of the paper, which exhibit an amusing lack of knowledge of the whole matter. No mention is made of the most important point of the subject, which is the final effect of a small fraction of an inch of wear per year, the existence of which is admitted. All know the disastrous effect of slack in freight trains, and how necessary is its consideration, yet our contemporary says, after trying to show how little the wear of knuckles actually is, "The wear of couplers is a much more important subject than the slack, and should be considered as such by all who are engaged in studying the coupler question." This contradicts the first position, and gives to the question of wear an importance which greatly exceeds that allotted to it in the paper criticised. There is apparently some confusion in the "editorial council" of our contemporary.

While our contemporary is confused regarding the effect of and the importance of considering the wear of knuckles in freight service, it is even in a worse plight regarding the slack in draft gear. It says: "For some reason it is assumed that the slack in the draw-bar attachment is one inch. Is this figure a proper one? Has all the work of the various master car builders who have been trying to improve draft rigging, and who have put on the very best arrangements which they could devise, amounted to so little that it is fair to assume one inch as the average slack for all draft rigging? In our opinion this figure should be reduced to one-fourth of an inch." We do not know where our contemporary has been railroading, but evidently its knowledge of draw gear is largely confined to the cuts in the Car Builders' Dictionary. Perhaps it would not be out of place to end this note with another quotation from the same columns: "We fear that there are a number of students of the coupler question who are disposed to be rather pessimistic in their views."

In a very short official letter Jay Gould has lately pointed out some things that could be done or should be done to increase the capacity of the elevated roads in New York City. It is safe to say that they are things that the Manhattan Company wishes to do. They are: (1) To complete the third tracks for ex-

press trains. (2) To secure more room for terminals at the Battery. (3) To connect the Brooklyn Bridge with the Sixth avenue line by tracks, "say through Centre and Canal streets." (4) To build a line at the upper end of the city connecting the east side and west side systems so that the company could run a portion of its trains entirely around the city. Of these propositions it may be said in general that the quickest way to give the city more and better "rapid transit" service is to allow the existing elevated railroads to increase their present facilities and to extend their lines. Very important additions could be made to the present accommodations, in the directions that Mr. Gould suggests, while the plans for the great, new, comprehensive and unobjectionable system are being made. Of this there is no doubt. On the other hand, if the elevated roads are to do more work, they must have more tracks, not only running tracks, but switching and yard tracks. It is unreasonable to growl two ways at once—to growl at being hung up on straps, and at every addition to the elevated tracks and structures. It is for the citizens to decide whether they will permit any further occupation of the streets or whether they will wait for the slower but presumably more complete relief to come from an entirely new system. But whatever they do, they should insist that the new system be of such comprehensive and thorough a kind that it can be expanded to fill the needs of the next half century. Perhaps it is not worth while to look further ahead.

A considerable part of the criticism aimed at the management of the Manhattan road springs from the feeling that the company, while asking for increased privileges, has not been zealously active to the extent of its ability in using for the most effective benefit to the public the privileges already possessed. While nine-tenths of the criticisms based on this feeling are wholly unreasonable, other points must be admitted to have appreciable weight. For instance, passengers waiting for trains during the crowded hours, morning and evening, have for a long time been exasperated by seeing about every other train made up of only four cars while the platforms are long enough for five. It appears that these short trains were run, not because a part of the engines were too light to haul five cars, but chiefly because the company had not seen fit to increase its stock of cars five per cent. This increase has now been made, and five-car trains are now universal on the busy lines during the busy hours. Additional trains have been put on above Fifty-ninth street on the West side, and the company has in other ways recently shown a marked disposition to improve its service. Express trains, which have heretofore been run to a very limited extent between 155th street and Rector street, are now run on the Third avenue line also, and the number on the West side has been increased. The problem of running express trains on the existing lines, among such an innumerable lot of accommodation trains, is not an easy one, and nothing less than the well-known skill of the experienced operating officers of this company would be equal to it. The three or four expresses hitherto run were easily managed. From the northern terminus, where they start, the way trains run from four to eight minutes apart, and the through trains could therefore be run past the former, without hindering them, by the use of the existing middle tracks. Only two passing points had to be arranged between 155th street and Fifty-ninth street; below Fifty-ninth street and Ninth avenue line, having a comparatively light traffic, afforded a favorable field for express trains. On the Third avenue line, where there are now a half-dozen expresses, the plan is feasible only by using the third (middle) track for a long distance. This track has been in existence a good while, but has heretofore been used for storing empty cars. The legal right of the company to maintain this third track is one of the principal points emphasized by the critics who claim that the company is unreasonably selfish in its attitude toward the city, and the questions concerning this right, and the effect of the additional tracks on the interests of abutters generally (whether the track be legally or illegally maintained), will be an important factor in deciding to what extent the company can increase its train service. Four of the new express trains run on the Sixth avenue line from Fifty-ninth street southward as far as Twenty-third, where they become accommodation trains. On this short section accommodation trains are only three or four minutes apart, and there are five intermediate stations, so that the express trains have to take their places on the passing tracks with precision and promptness, in order to avoid disturbing the slower trains.

Locomotive runners who feel that they are abused

when called into the office to explain a delay of five minutes might learn a point or two by looking into the handling of trains here, where a two-minute delay must be explained, and where a five-minute delay not satisfactorily accounted for often involves points that will cause an engineman to lie awake nights.

Financial Prospects for 1891.

The railroad situation to-day, when looked at from the investor's standpoint, presents such a mixture of good and bad features that it is hard to disentangle the one from the other. It is not wholly bad, as it was in 1884 or 1888, when roads had been recklessly duplicated beyond the capacity of the country to furnish them with business, so that their gross earnings per mile were falling rapidly. Still less is it wholly good, as in 1880 or, to a certain extent, at the close of 1886, when the country had fully grown up to its railroad facilities and there was profitable business enough for all to make money. The present situation is not so simple. There has been no over-construction of roads since 1887, but we wait in vain for the good results of our self-restraint. There seems to be business enough, but it is unprofitable business. The gross earnings are satisfactory to the statistician, but the net earnings fail to meet the wants of the investor.

As far as construction goes the country has had about time enough to grow up to the premature mileage of 1887. In that year, it will be remembered, nearly 13,000 miles were added to the railroad system of the country. The three following years have averaged less than half that amount—a little under 7,000 miles in 1888, a little over 5,000 (net increase) in 1889 and just about 6,000 in 1890. What is more to the point, the new construction of the last three years has nearly all been put where it was needed to create new business, rather than to fight for what already existed.

Meantime the population of the country was steadily increasing, bringing with it an increase in traffic and in gross earnings. In the aggregate for all roads, 1888 showed a slight advance over 1887, 1889 a decided advance over 1888, and 1890 a gain which will probably be still more decided. But the increase of mileage was such that the average per mile fell from \$6,861 in the fiscal year 1887 to \$6,540 in 1888, and has not by any means made up this loss in the two years succeeding. It is not the gross earnings, however, which make the trouble. It is the continually increasing percentage of operating expenses, which leaves a smaller margin of net profit. Traffic is constantly carried at lower rates, and often at rates which are barely above the expense of handling. In 1887 the average receipts per ton mile were 1.034 cents; in 1888, 0.977 cent; in 1889, 0.976 cent. In the fiscal years of the railroad companies, which as a rule end on June 30, the figures for 1890 will probably not be much lower than for 1889; but for the last half of the year it is likely that freight has been carried at an average of about nine-tenths of a cent a ton a mile.

Thus it happens that the gains in gross earnings for 1890 have not been accompanied by corresponding gains in net; and during the latter part of the year the net earnings have shown a positive loss. Taking the figures of the *Financial Chronicle* as a basis, we find that 116 roads, from Jan. 1 to Nov. 30, show gross earnings of \$575,000,000 for 1890 against \$531,000,000 in 1889, an increase of \$44,000,000, or more than 8 per cent.; but the net earnings were \$191,000,000 in 1890 as against 183,000,000 in 1889, a gain of little over 4 per cent. Furthermore, this gain was wholly made in the first half year. Since June 30, four months out of the five show a positive loss. The aggregate figures for all the roads reporting result as follows:

	Gain in gross earnings.	Gain in net earnings.	Loss in net earnings.
July.	\$2,890,000	...	\$238,000
August.	1,265,000	...	1,26,000
September.	4,625,000	\$938,000	...
October.	1,855,000	...	315,000
November.	2,745,000	...	147,000
Total since June 30.	\$13,361,000	\$938,000	\$2,168,000

Net total loss..... \$1,168,000
Inasmuch as these figures represent not merely increased gross earnings, but increased gross earnings per mile, the fall in the net may be regarded as phenomenal. It indicates that rates have been depressed by artificial causes other than scant business. Directly or indirectly, legislation has had a good deal to do with them. While it is unsafe to generalize, we may say that state legislation has had rather less influence in this matter than is commonly supposed, and national legislation rather more. The only group which shows a loss in net earnings for the year—and that, too, in the face of a very large increase in gross—is the Middle Western, which has

suffered little at the hands of state authorities. The effect of national legislation has been twofold. By the prohibition of pools it has prevented the maintenance of rates; by the short haul clause it has forced local reductions to be made general, and has compelled a road to treat different parts of its business without much regard to their relative economy. This last influence has had a bad effect at both ends, causing rates to be lowered and expenses increased, both at the same time.

Under these circumstances it is no wonder that investors are shy. While the stock market has recovered from the temporary depression incident to the panic a couple of months ago, there are no signs of any permanent demand such as manifested itself so strongly in 1886 and the beginning of 1887. Nor is it desirable that there should be. There is, in the present temper of public feeling, real danger of additional legislation. The only trustworthy safeguard against such legislation is found in the timidity of investors. If a state wants more roads, and cannot get them unless it treats existing ones properly, there will be local interests opposed to radical legislation. It was these local interests, and not the Supreme Court of the United States, which caused a reaction from the extreme anti-railroad measures of 1873 and 1874; and although the Supreme Court knows more about railroad legislation to-day than it did fifteen years ago, it would scarcely possess the power to make state laws harmless, even if it had the will to do so.

It is to facts of this sort, rather than to the silver question, that the timidity of investors is mainly to be ascribed. It is rather as a symptom of legislative struggles between sections than for its own sake that the silver agitation has even the moderate importance which it possesses in the world of railroad finance. And in the light of the facts just quoted, it must be confessed that railroad investors are showing their wisdom. While the volume of business in the country has grown up to its railroad mileage, the rates which the companies are able to charge are depressed by outside conditions. A volume of business which would pay under a pooling system, will not pay without it. If the public is willing to allow the roads to make money in any way they can, it can have as many roads as it can afford. If it insists on certain artificial restrictions on railroad economy and operation, whether in the form of Interstate Commerce Acts or state statutes, it must, in the long run, get along with fewer roads.

Can Railroad Men Know Too Much?

The singular doctrine was advanced by one of the speakers at the last meeting of the Western Railway Club that it is not desirable that railroad officers should know too much about the details of the machines and apparatus that they buy, but that such intimate knowledge should be left to the manufacturers. This was said apropos of Mr. Barnes' careful comparative analysis of triple valves, presented at the December meeting. The speaker's position was that accurate knowledge of triples can safely be left to the makers; what the railroad officers have to consider is leverages and foundation rigging.

Philip Gilbert Hamerton, in some of his essays, has put forward the theory that any individual mind has a definite capacity for learning languages, and that when the intellectual language tank is full no further knowledge of one language can be taken in without crowding out some other language. Something of this theory appears to be held by some speculative philosophers with regard to the mechanical compartment of the railroad mind. We often hear, in a more or less modified form, the doctrine that the railroads should select by one process or another what they want, and buy it, and leave to the makers that special knowledge of processes of manufacture, of materials, and of details of mechanism which can only be had by specialists. This is the point of the criticism made on the analysis of triple valves, if it has any point. The fundamental error of this doctrine is in the assumption that there is a railroad mind of limited capacity which must not be stuffed too full or it will get clogged or perhaps burst. The fact is that this abstract railroad mind is the sum of a great many individual intelligences. The Superintendent of Motive Power, for example, must know a great deal about a great many things, but there is an immense field in which he need know very little. Further, his own department may be subdivided among specialists to any extent that he finds profitable. If he finds his load of knowledge getting too heavy he can shift some of it. The practical result of this sub-division of knowledge in the technical departments of railroading has

been the development of specialists who have deep and accurate knowledge of all the details of their business, and who have been able to teach manufacturers a great many things.

The most intelligent manufacturers know this very well, and encourage the spread among the railroads of the practice of testing, and analyzing, and research of all kinds. The Westinghouse Air Brake Company, for example, would be the last people to think that railroad men could know too much about any part of the brake mechanism. On the contrary, that company yearly spends a great deal of money in instructing railroad officers and employés, and welcomes any help that it can get in this work from the railroads themselves. So with other makers of supplies; they know that the ultimate effect of accurate knowledge is good for them. It puts a premium on honesty and knowledge and skill, and will certainly weed out those makers who aim merely to turn out something that they can sell.

The first results are disagreeable, of course. For instance, we lately saw one-third of a large order for steel boiler plates rejected, and every one has seen links and axles sent back by the car load. But the more accurate the knowledge of the railroad men the greater the gain to the competent and honest manufacturer in two ways: (1) Relief from dishonest and incompetent competition, and (2) Safety from rejection of his material by ignorant inspectors. Of the gain to the railroad companies themselves we need not speak; it is too obvious.

How Can Strikers Be Punished?

The Scotch railroad strike has this week been reported as ended, the railroad companies having succeeded in restoring their traffic to something near its normal condition. Later dispatches tell of attacks on railroad premises, stoning of trains and other lawlessness, so that it is still hard to get at the real state of the case, but several American newspapers have taken occasion to offer the usual reflections on the subject of strikes in general. Another utterance on the subject which is just now attracting attention is the annual report of the New York State Board of Arbitration, which, in discussing the New York Central strike of last summer, proposes as a remedy the enactment of laws which shall place railroad employés on a semi-military basis, subject to Government supervision, with regulations which shall make unreasonable strikes, by which much suffering and loss is inflicted on innocent passengers, punishable under the criminal laws the same as mutiny. This is the position taken by the New York *Evening Post*, one of the most intelligent authorities on the subject, and, as everyone recognizes, it touches the ultimate and vital question involved in the discussion of strikes. Capital has no feelings, and so cannot be made amenable to corporal punishment; and workmen, generally speaking, have no money, and so cannot be reached by pecuniary penalties.

It is doubtless true, as remarked by the Springfield *Republican*, that the propositions of the New York arbitrators involve no unjust hardship to workingmen. A striker who, by suddenly leaving his work, inflicts discomfort, loss and even suffering upon innocent women and children, deserves to suffer himself. But there are generally so many other elements involved in any important struggle that it is extremely difficult to get the issue squarely presented. Many, perhaps most, hard fought strikes are partly based on alleged ill-treatment by subordinate officers, so that the question of human motives cannot be left out. Capital, pure and simple, must base its arguments and action chiefly on the law of supply and demand, but as long as there are careless directors and overbearing superintendents there will be a plausible claim in most strikes, that the officers, protected by the impersonality of the corporation, are partly responsible for the injury inflicted upon the public; and the workmen, backed by the sympathy of the general public, will stoutly resist the apparent unfairness of punishing capital by money penalties while punishing "labor" by imprisonment. This will make it extremely difficult, if not impossible, in a democratic country to secure anything like military control.

Apparently the only available remedial agencies are those which can be applied along the lines of ameliorating the minor causes of friction. We must for the present work along the edges rather than at the centre of the problem. Take, for instance, one of the main questions in the Scotch strike, the hours of labor. On the mere basis of supply and demand, plenty of men could doubtless be hired to work 15 hours a day for the wages now given for 10 or 12 hours, and it is futile for the men to hold out for a reduction of time as long as they have nothing but the

usual arguments. The rational basis on which to demand shorter hours is the claim that the quality of the work performed can thereby be improved. If, now, the true interests of the public demand a better quality of service, in the interests of safety, and the companies, looking only at economy, fail to perceive the true relations between economy and safety, the public must take measures to make neglect of safety more costly (uneconomical) to the roads. Make a blunder by a tired-out man *prima facie* evidence of liability on the part of the employer. That would be one way to approach the main question; indirect perhaps, but what better way can be found?

Again, if the difficulty be one of side issues merely, if for instance employer and employé do not negotiate with each other in the proper spirit, as equals, the remedy of the state is not to provide a quasi-court, without powers, to "arbitrate" between parties who will not submit to its authority, but to lubricate the machinery by which the courts already established for the cure of all injustice can reach the wrongdoers. Every one knows that the difficulties we are considering, like a large share of all other human ills, consist largely in disagreements about matters which are apparently trifling, and perhaps are really so as compared with the main issue. As an ounce of grit can burn off a journal and wreck a train, so a small piece of ill nature on the part of an officer can upset the good feeling of a thousand employés. There is still room for effort in well known directions, whatever unsolvable difficulties there may be in the broader problem.

December Accidents.

Our record of train accidents in December, given in this number, includes 82 collisions, 111 derailments and 14 other accidents, a total of 207 accidents, in which 53 persons were killed and 183 injured. The detailed list printed on another page contains accounts only of the more important of these accidents. All which cause no death or injury of persons are omitted, except where the circumstances of the accident as reported make it of special interest.

These accidents are classified as follows:

COLLISIONS:

Rear.....	32
Butting.....	29
Crossing and miscellaneous.....	21
	82

DERAILMENTS:

Broken rail.....	8
Loose or spread rail.....	6
Broken bridge.....	2
Defective switch.....	4
Defective frog.....	5
Broken wheel.....	5
Broken axle.....	7
Broken truck.....	3
Broken drawbar.....	9
Misplaced switch.....	1
Bad loading.....	1
Careless running.....	4
Track repairers.....	2
Cattle on track.....	4
Landslide.....	3
Malicious obstruction.....	3
Accidental obstruction.....	2
Purposely misplaced switch.....	1
Snow.....	2
Unexplained.....	40
	111

OTHER ACCIDENTS:

Boiler explosion.....	2
Fire in car.....	4
Explosion of heater.....	1
Miscellaneous.....	7
	14

Total number of accidents..... 207

The causes of collisions, where given, were as follows:

	Rear.	Butting.	Crossing and other.	Tot'l.
Trains breaking in two.....	7	1	1	7
Misplaced switch.....	3	1	1	5
Failure to give or observe signal.....	2	2
Mistake in giving or understanding orders.....	9	7	12	7
Miscellaneous.....	9	8	12	29
Unexplained.....	11	13	8	32
Total.....	32	29	21	82

A general classification shows:

	Collisions.	Derailments.	Other.	Total.	P. c.
Defects of road.....	25	25	12	62	12
Defects of equipment.....	7	17	7	31	15
Negligence in operating.....	42	14	5	61	29
Unforeseen obstructions and maliciousness.....	1	15	2	18	9
Unexplained.....	32	40	..	72	35
Total.....	82	111	14	207	100

The number of trains involved is as follows:

	Collisions.	Derailments.	Other.	Total.	P. c.
Passenger.....	35	35	10	80	28
Freight and other.....	120	78	4	202	72
Total.....	155	113	14	282	100

The casualties may be divided as follows:

	Collisions.	Derailments.	Other.	Total.
Employés.....	14	19	2	35
Passengers.....	6	7	..	13
Others.....	2	3	..	5
Total.....	22	29	2	53

	Employés.	Passengers.	Others.	Total.
Employés.....	52	48	4	104
Passengers.....	39	34	5	78
Others.....	1	1
Total.....	91	82	10	183

The casualties to passengers and employés, when

divided according to classes of causes, appear as follows:

	Pass. killed.	Pass. injured.	Emp. killed.	Emp. injured.	
Defects of road.....	6	11	4	7	
Defects of equipment.....		8	2	6	
Negligence in operating.....	7	39	18	53	
Unforeseen obstructions and maliceousness.....		4	4	13	
Unexplained.....		16	7	25	
Total.....	13	78	35	104	

Thirty-one accidents caused the death of one or more persons each, and 48 caused injury but not death, leaving 128 (62 per cent. of the whole) which caused no personal injury worthy of record.

The comparison with December of the three previous years shows:

	1890.	1889.	1888.	1887.
Rear collisions.....	32	50	25	51
Butting ".....	29	23	32	36
Crossing and other collisions.....	21	15	7	5
Derailements.....	111	67	61	83
Other accidents.....	14	11	11	7
Total.....	207	168	136	182
Employés killed.....	35	44	41	57
Others.....	18	8	5	14
Employés injured.....	104	122	73	87
Others.....	79	52	63	124
Passenger trains involved.....	80	39	36	79

Average per day:

Accidents.....	6.68	5.42	4.39	5.87
Killed.....	1.71	1.68	1.48	2.29
Injured.....	5.90	5.61	4.39	6.50

Average per accident:

Killed.....	0.256	0.309	0.338	0.390
Injured.....	0.884	1.036	1.000	1.159

The worst accident of the month was that at Bolivar, O., on the 18th, where 6 passengers were killed and 6 injured. We have classed this among those caused by defects of road, as the inspector of the Ohio State Commission says that the rails spread an inch or so, and that the sleepers were old and decayed. This inspector's report is, however, rather incomplete, and fails to give information on some points which ought to be cleared up. His report and that printed in the *Railroad Gazette* of Dec. 26 are contradictory in some respects. The inspector says that the hind passenger car jumped the track on a 4-degree curve and not on a tangent. The elevation of the outer rail was $2\frac{1}{4}$ in. He says nothing about the speed of the train, except to venture the opinion that "the engineer may have been making up time, as he was 10 minutes late." The coroner was satisfied that the speed was only about 15 miles an hour. The inspector says that the lack of iron [inside] guard rails was doubtless the cause of the car tipping off the trestle; but he does not explain how or why the wheels rode over the wooden outside guard timber with which the bridge was fitted. He says that the ties on the trestle were 12 in. apart in the clear, but says nothing about their having been bunched together, as appears from the other report. The track was in fairly good surface and line, but the sleepers were badly cut up with spike holes. There were a few rail braces, but the gauge was found $\frac{3}{4}$ in. too wide, and the roadmaster told the inspector that after the derailment the gauge was found $1\frac{1}{2}$ in. too wide.

The inspector regards the custom of the road in laying the track 4 ft. $9\frac{1}{4}$ in. gauge on this curve as a chief cause of the derailment, but in view of the fact that experts are not agreed as to the amount of widening that is necessary or expedient on curves of various degrees, and that cars and engines made for 4 ft. $8\frac{1}{2}$ in. track have been run thousands of miles on track of a wider gauge than 4 ft. $9\frac{1}{4}$ in., and as the defective character of the sleepers appears (from the report) to afford ample explanation of the finding of the 4 ft. 10 in. gauge after the derailment, this criticism can hardly be said to justify itself.

Other accidents resulting in death to passengers were the collisions at Walton, Ky., the 4th, The Needles, Cal., 11th, and Jacksonville, Ill., the 4th. The latter was one of the most startling accidents of the month, three passengers being killed. It appears from the investigations of a coroner's jury that the rails were slippery on account of frost, and that the freight trainmen did not begin soon enough to control the speed. The jury, however, deemed the evidence insufficient to hold the men for a criminal prosecution. The wholly inadequate view which the public are enabled to take of a case of this kind, or, in fact, of any collision resulting from the running of a train at too high speed, is illustrated by the facts connected with a case reported in our November record which was very similar to this one at Jacksonville. In that case we were unable, from the reports secured, to say anything definite about the cause, but from information incidentally acquired since it appears that the mystery is explained as easily as was Mark Twain's celebrated fish story, which became perfectly clear as soon as it was known that the boy who told it lied. The collision in question was caused simply by the fact that the freight conductor and his brakeman were sound asleep.

It is difficult indeed even for a superintendent, with full "power to send for persons and papers," to get at the real causes of many collisions; but this fact does not remove the necessity for the investigation of all such cases by a competent authority, such as a state railroad commission. It is true that every one knows how these accidents have been caused in the past, and there have been so many of the various kinds that one can almost predict beforehand that a certain "accident" will

surely be found to come within one of two or three well-known classes; but this is not enough. The preaching of railroad commissioners, of coroners, of the advocates of patent brakes and patent signals, of technical newspapers, is still ineffectual, and there is need for further work in showing up the *quantity* as well as the kind of this class of losses and disasters.

The butting collision near Cardiff, Col., on the 19th, is said to have been caused by the engineer failing to see the signalman's lantern because he was blinded by the headlight of another locomotive coming toward him. While this does not excuse the flagman for not having torpedoes properly placed, it shows the importance of considering the dangers incident to a circumstance of this kind. It is very common to see platform lights at stations, as well as lights of various sorts in other locations near the track, all provided with quite powerful reflectors and hung so as to shine directly in the face of engineers who must pass at high speed on the main track. Those who are inclined to disregard this question, for the reason that engineers make little or no complaint about the difficulties encountered, should stop a moment to consider how many engineers there are who, taking many small risks every day, come to think that taking risks is a part of their legitimate duty, and that therefore they must put up with various things which impair their view of the track, regarding them as inevitable.

The derailment at Camden, N. J., on the 5th was caused by the blunder of an operator who had been asleep, and, suddenly awaking, in his confusion pulled the wrong lever, assuming that the approaching train was on the Reading instead of the West Jersey road. The operator said that he had been suffering with severe pains in his head for some time, and had been unable to take his regular amount of sleep.

A passenger train on the New York Central at Gainesville, N. Y., on the 24th, was damaged by striking a car which had been blown by high winds from a siding so as to foul the main line, and which had been struck by another passenger train an hour before. Why the first train did not place the car in a safe position is unexplained.

A remarkable derailment occurred at Lachine, on the Grand Trunk, eight miles west of Montreal, about 6 o'clock on the morning of Dec. 4. At that hour a local passenger train was due from Montreal, and the stationman, on hearing a whistle, set the switch for the branch to Lachine wharf, the route regularly taken by that train; but the train which actually came, instead of being the local passenger train, was a through express, about six hours late, which, of course, should have proceeded along the main line. The engineer, however, failed to notice that he was thrown upon the branch, and actually ran at full speed upon it and over it for more than half a mile to the end of the track on a wharf, where his engine went into the St. Lawrence River, and he was drowned. It appears, from the testimony of the fireman, who got out of the water alive, that the engineer discovered his error and applied the brake before reaching the wharf, but not in time to save the engine, although only four wheels behind the tender were derailed. The man who set the switch should have waited for a special whistle signal before turning it. The morning was very cold and snow was blowing.

On the Chicago & Northwestern, near Rochelle, Ill., on Dec. 1, a brakeman was killed and two others injured by a stick of timber swinging out across the north track from a train passing on the south track. A passenger train on the Intercolonial was derailed while running at high speed, near Levis, Que., Dec. 18, and 6 passengers were killed.

The New York State Senate has passed the Stewart Rapid Transit bill giving the present Rapid Transit Commissioners authority to lay out routes, and, acting with the local authorities, sell franchises for underground or overhead railroads in New York City. It further authorizes the Commissioners to grant permission to the New York Elevated Railway Company to extend its present tracks. The provision authorizing the Commissioners to permit the elevated roads to construct a loop in Battery Park was struck out by a vote of 20 to 11. A proposed amendment which prohibited the company from constructing a third track in Third Avenue was, however, voted down. The bill as passed also permits the New York Central to construct an underground railroad southward from the Grand Central Station, at Forty-second Street, to the City Hall.

The indicting last week of a prominent citizen of Hannibal, Mo., for bribing a railroad employé is the result of a clever piece of detective work on the part of Superintendent Carman, of the Western Railway Weighing Association. Mr. Carman had been satisfied for some time that his weighmasters were being tampered with by shippers at certain points, notably Hannibal. Two of his men were accordingly sent there with instructions as to their duties, and were employed by the local roads as weighmasters. Soon after their arrival they were approached by a man who had not previously been suspected—Manager Edmundson, of the Empire Lime Co.—and entertained a proposition from him to underbill his shipments by reporting false weights,

and he agreed to divide with them the saving in the freight charges effected by such practice. Several cars were accordingly so treated, upon which they received their proportion of the difference in the freight, which they promptly remitted to Chicago, together with statements and affidavits which were laid before a grand jury of the United States Court at Hannibal, who promptly indicted the manager in question. The arrest has caused a decided sensation at Hannibal, and is likely to put a stop to such practices there. The charge under which Mr. Edmundson is indicted is the payment of money to agents of common carriers to induce them to discriminate in his favor by underbilling.

Mr. Swank has received complete returns of the production of pig iron in the United States in 1890 from the makers, and reports the aggregate as 9,202,703 gross tons, or 10,307,028 net tons. This is an increase of 21 per cent. over our make of last year, and changes our position in future statistical tables dealing with iron to the first column instead of the second, which we have occupied for so long a time.

The production, by years, of the three chief iron producing countries has been as below, in gross tons:

	United States.	United Kingdom.	Germany.
1885.....	4,044,526	7,250,657	3,687,433
1886.....	5,683,329	6,870,665	3,528,658
1887.....	6,417,181	7,441,927	4,023,953
1888.....	6,489,738	7,898,634	4,337,121
1889.....	7,603,612	8,245,336	4,387,504
1890.....	9,202,702

While the production for the last year in England and Germany is yet unknown, it is improbable that Germany will show any material advance and the British production will probably be less than eight million tons; so that we shall probably lead England by about a quarter of a million tons. The figures for consumption, however, differ from those for production; we have 414,178 more gross tons of iron on hand than at this time last year, and, assuming that our receipts for the two past years have been equal to the shipments to this country from England, we have this year taken only 509,314 tons, including 318,108 tons of tin plates, as against 589,606 tons in 1889, which would bring our consumption for the year down to about 8,710,000 tons. In England, on the contrary, the stocks in public stores have decreased from 1,508,324 to 912,600 tons, or a decrease of 595,634, and Great Britain's exports have decreased by about 187,000 tons. So it is probable that, in spite of their decreased production, the English have increased their consumption.

A correspondent writes: "This morning I stood a long time in the rear vestibule of a fast train on the road. We kept up a steady 50-mile pace. Every few minutes a sharp crash would tell me that we had passed a facing point switch, but there was never a distant signal, or even a high target, only the common red and white vanes, 6 ft. high. At one point we went through a deep cut on a curve, and just beyond the curve was a siding, entered by a facing point switch. On the siding stood two box cars. The engineer could not have seen the target or the cars 100 yards away. That trap we passed too at 50 miles an hour. Now, supposing some careless fellow had set that switch for the side track without sending a flag back 1,000 ft. in the cut. We were a little late, and it might have been supposed that we had passed. Or imagine any one of half a dozen other things that might have happened. It is bad enough to run fast trains over any facing point switches without distant signals, but in the place that I have described it is tempting Providence. Why don't you punch 'em up?" Patience, friend. We do "punch 'em up" till they are sick and we are sick; but it is telling, even if but slowly. Meantime thank Heaven for past mercies, and go west yourself and send your wife and friends west by some other road.

The storm of Sunday last consisted chiefly of sticky snow and caused great damage to telegraph and telephone lines throughout New York, New Jersey, Connecticut and Pennsylvania, and parts of Virginia, Maryland, Ohio and Indiana. Many poles fell across tracks, leaving the wires in a state of useless confusion, and hindering trains. The greatest destruction was in New Jersey. Elizabeth was totally bereft of telegraph, telephone, fire alarm and electric light systems. Only one wire was left working out of Philadelphia, and New York City was entirely without communication by wire. All the railroads running into New York were disabled by fallen poles and the difficulty of despatching trains, but they kept trains moving very well on old-fashioned timetable rules. The New York division of the Pennsylvania was deprived of the use of its block system to a greater extent than ever before. On Thursday the 22d a heavy rain storm swept over Eastern New York and the greater part of Connecticut. All the streams were greatly swollen and a number of railroad bridges were moved from their foundations. The Housatonic dam near Birmingham, Conn., was carried away, causing, however, remarkably little damage; but all the mills at Shelton were stopped in consequence. Several of these, however, promptly put in steam engines and were running in full force within four or five days. The dam will be rebuilt.

Train Accidents in the United States in December.

COLLISIONS.

REAR.

4th, on New London Northern, near Williams Crossing, Conn., a freight train ran into the rear of another freight, wrecking several cars and injuring a brakeman.

8th, night, on Richmond and Danville, near Greenville, S. C., a freight train broke in two, and the rear portion ran into the forward one, wrecking a number of cars. A brakeman was killed.

8th, on Cincinnati, Hamilton & Dayton, at McCombs, O., a southbound passenger train ran over a misplaced switch and into a freight train standing on a side track, wrecking engine, tender and baggage car. The baggage master was badly injured.

10th, on Flint & Pere Marquette, at Grand Blanc, Mich., a freight train ran into the rear of another freight standing on the main track, wrecking engine and a dozen cars. A fireman was injured.

11th, on Columbus, Hocking Valley & Toledo, near Sand Run, O., a freight train ran into a car loaded with lumber standing on the main track, wrecking it and damaging the locomotive. One trainman killed and another badly injured.

11th, on New York & New England, near Terryville, Conn., the caboose and 3 cars of a freight train broke loose while ascending a grade and ran back into the head of another train, wrecking a dozen cars, which took fire and were burned up. Fireman killed; engineer seriously injured.

11th, midnight, on Chicago & Eastern Illinois, near Pullman, Ill., a freight train ran into the rear of a preceding freight which had come to stop and the caboose of which, it is said, displayed no signal lights. Engine, caboose and a number of cars wrecked. Naphtha in two tank cars was split over the wreck, which took fire and was totally consumed. Conductor badly injured.

13th, on Pittsburgh, Cincinnati, Chicago & St. Louis, near Pittsburgh, Pa., a freight train ran into the rear of a preceding freight, wrecking caboose. Three trainmen and an employe riding in the caboose were injured.

14th, on Kanawha & Michigan, near Buffalo, W. Va., a passenger train running at speed struck a misplaced switch and collided with some lodging cars of a steam shovel outfit standing on a siding, wrecking a number of them and overturning the engine and damaging the baggage car. Engineer, fireman, conductor, baggage man and several employes in the work train were injured.

16th, 9:20 p. m., on Hannibal & St. Joseph, near Breckenridge, Mo., passenger train, which was stopped on account of hot box, was run into at the rear by a freight train, damaging engine and rear sleeping car. Shortly afterwards a second freight ran into and wrecked the caboose of the first freight, injuring engineer and fireman.

19th, about 1:40 a. m., on Colorado Midland, at Sands Station, Col., an eastbound passenger train ran over a misplaced switch and into some work train cars standing on a siding, injuring a trainman and killing 2 tramps stealing a ride on the front platform of the baggage car and a man asleep in one of the lodging cars. A brakeman of a freight train waiting on the siding behind the work train cars signaled the passenger train, but the engineer says he was blinded by the headlight of the freight and saw no signal.

20th, on Southern Pacific, at Algiers, La., a switching freight train collided with some box cars, damaging one car and disabling the engine. Two brakemen injured.

21st, 10 a. m., on Manhattan (elevated) road, at Sixth avenue and Twenty-eighth street, New York City, a passenger train which had come to a stop by reason of the engine blowing out a cylinder head was run into by a following passenger train which was carelessly managed, slightly damaging the rear car.

21st, night, on New York Central & Hudson River, at Little Falls, N. Y., a freight train ran into the rear of another freight, smashing a number of cars and killing a brakeman.

22d, on Delaware & Hudson Canal Co.'s road, at Bla Mills, N. Y., a passenger train ran over a purposely misplaced switch and into the rear of a freight train standing on a siding, damaging engine, baggage car and 4 freight cars.

23d, on New York, Ontario & Western, at North Norwich, N. Y., a freight train ran into the rear of another freight, wrecking several cars. Engineer and fireman injured. The wreck was fired by the explosion of an oil tank car, and 14 cars were consumed.

30th, on Baltimore & Ohio, at Annapolis Junction, Md., a passenger train ran into the rear of a freight train which had been stopped by a disabled train ahead of it, badly damaging locomotive, baggage and express cars. Three trainmen and several passengers injured.

And 14 others on 13 roads, involving 3 passenger and 20 freight trains.

BUTTING.

1st, on Chicago & Erie, at Sixty-fourth and Wallace streets, Chicago, an eastbound passenger train ran over a misplaced switch and into the head of a freight train standing on a siding, injuring an engineer and 2 passengers.

5th, on St. Louis & San Francisco, near Stanton, Mo., butting collision between 2 freight trains, wrecking both engines and injuring an engineer.

6th, on Old Colony, near Bolton, Mass., butting collision between a westbound passenger train and a freight train preparing to enter a siding. Both engines were derailed, the passenger engine and the baggage, mail and express cars being thrown over an embankment. Two trainmen and 1 passenger injured.

12th, on Union Pacific, near Coyote, Wash., butting collision between 2 freight trains, making a pretty bad wreck, in which 1 brakeman was killed and engineer and fireman injured.

13th, on Cincinnati Southern, at Harriman Junction, Tenn., butting collision between two freights, killing a fireman.

14th, on Cincinnati, New Orleans & Texas Pacific, at Elko Station, Ky., butting collision between two freight trains, due to an operator's blunder. A brakeman was killed and an engineer badly injured.

14th, on Buffalo, Rochester & Pittsburgh, at Ridgway, Pa., butting collision between two freight trains, due to a dispatcher's mistake, both engines and many cars being piled up in a bad wreck.

16th, near Mobile, Ala., butting collision between East Tennessee, Virginia & Georgia passenger train and

a Mobile & Ohio freight, badly damaging both engines and injuring 3 passengers.

17th, on Louisville & Nashville, near Ponce de Leon, Fla., collision between a freight train and a construction train standing on the main track, due to a misunderstanding of orders. Engineer and conductor injured by jumping.

17th, on Baltimore & Ohio, at Martinsburg, W. Va., an empty engine collided with a freight train during a heavy snow storm, wrecking engine, caboose and several cars.

18th, on Louisville & Nashville, at Bowling Green, Ky., butting collision between two freight trains, due to a misunderstanding of orders. Both engines and half a dozen cars badly damaged and 3 trainmen killed.

21th, on Iowa Central, near Grinnell, Ia., butting collision between a passenger train and a wrecking train, disabling both engines and damaging several coaches. Six passengers and an engineer injured, the latter by jumping.

26th, on Central Pacific, near Fresno, Cal., butting collision between a freight train and an empty engine, doing considerable damage, and killing a brakeman and badly injuring an engineer and 2 other trainmen.

30th, on St. Louis, Iron Mountain & Southern, near Arkadelphia, Ark., butting collision between two passenger trains, doing considerable damage and slightly injuring a number of passengers.

30th, on Louisville & Nashville, in Nashville, Tenn., butting collision between a passenger train and a yard engine hauling some freight cars over the main track, doing slight damage. Two passengers injured.

31st, on Cleveland, Cincinnati, Chicago & St. Louis, near Dayton, O., collision between two passenger trains in a fog, damaging both locomotives and injuring an engineer.

31st, on Delaware & Hudson Canal Co.'s road, at Windsor, N. Y., butting collision between two freights, wrecking both engines and half a dozen cars, and killing a fireman.

31st, on Iowa Central, near Oskaloosa, Ia., butting collision between a passenger train running rapidly and a standing freight train, wrecking the forward portions of both trains and injuring several passengers. It is said that the freight train had trespassed several minutes on the passenger train's time.

And 10 others on 8 roads, involving 3 passenger and 17 freight trains.

CROSSING AND MISCELLANEOUS.

4th, on Louisville & Nashville, at Walton, Ky., collision between a passenger train and a freight, considerable damage resulting. Two passengers killed and 5 injured.

4th, 2 a. m., at the crossing in Jacksonville, Ill., the rear sleeping car of a Chicago & Alton passenger train standing at the station was run into and cut in two by a Wabash coal train approaching the crossing uncontrolled, killing 2 and injuring 6 passengers. One of the latter has since died of his injuries.

7th, on Fitchburg road, near South Keene, N. H., collision between a passenger train and a switching engine, in which both locomotives were badly damaged, and 1 trainman and 3 passengers injured.

9th, in Rochester, N. Y., a misplaced switch caused a collision between a West Shore passenger train and a New York Central & Hudson River freight. The damage was slight, both trains moving in the same direction. Engineer injured.

13th, 5:30 p. m., on Manhattan Elevated, Third avenue near 102d street, New York City, collision at a switch between a southbound passenger train and an empty passenger train intending to take the main track, derailing the engine of the latter.

13th, at West Penn Junction, Pa., an Allegheny Valley freight train struck the rear portion of a Pennsylvania freight train projecting over the main track from a siding, damaging several cars and overturning the caboose. Fireman injured.

15th, at 6:30 a. m., on Baltimore & Ohio, at Pittsburgh, Pa., a switching freight collided with some box cars, driving the tank through the engine cab, severely injuring 4 trainmen.

18th, at the crossing in Portland, Or., a Southern Pacific passenger train ran into the side of a Portland & Vancouver passenger train, overturning 2 coaches. Several passengers were slightly injured.

22d, on New York, Lake Erie & Western, near Union, N. Y., side collision at a switch between two freight trains moving in the same direction. One of the engines was thrown down an embankment and 5 cars were derailed and damaged.

30th, at the crossing in Trinway, O., collision between Pittsburgh, Fort Wayne & Chicago and Cleveland, Akron & Columbus freight trains, derailing an engine and one car and injuring an engineer. There was a dense fog at the time.

And 11 others on 9 roads, involving 2 passenger and 18 freight trains.

DERAILMENTS.

DEFECTS OF ROAD.

4th, on Northern Pacific, at St. Paul, Minn., engine and several cars of switching freight train derailed by a broken rail and badly wrecked. Fireman killed and engineer badly scalded.

9th, on International & Great Northern, at Price's Switch, Tex., passenger train thrown from the track by the spreading of the rails and ditched. The engine was overturned, killing the fireman and injuring the engineer.

11th, on Louisville & Nashville, at Shoal River, Fla., an eastbound mixed train broke through a trestle, killing 2 trainmen and injuring a number of passengers.

12th, on New York, Lake Erie & Western, near Carlton Hill, N. J., 3 freight cars in a mixed train were derailed at a drawbridge and thrown down an embankment by the imperfect action of an automatic device protecting the draw.

13th, on Charleston, Cincinnati & Chicago, near Camden, S. C., freight train thrown from the track by the spreading of the rails, injuring a brakeman.

15th, on Houston & Texas Central, near Havre Station, Tex., passenger train derailed by a defective bridge, the baggage, mail and express cars and a coach toppling over an embankment and another coach being thrown across the track. Engineer badly hurt.

18th, about 3 p. m., on Wheeling & Lake Erie, near Bolivar, O., the rear car of an east bound passenger train, running about 15 miles an hour, was derailed at and thrown off a trestle 35 ft. into a ravine below. The car was badly wrecked, and of the 14 passengers in it 4 were killed and 8 others injured, 2 of the latter having since died. The stove set the car afire, but the flames were quickly extinguished. Mention of this accident is made in the *Railroad Gazette* of Dec. 26. The cause of derailment appears to have been spreading of rails. The

floor system of the bridge is criticised by the state inspector.

19th, on Pennsylvania, at Altoona, Pa., westbound passenger train derailed by a broken frog.

22d, on Baltimore & Eastern Shore, at Walston's Switch, Md., passenger train derailed by a broken rail, injuring conductor and an employe.

23d, on New York, New Haven & Hartford, near Leete's Island, Conn., passenger train thrown from the track by a broken rail, the tender and 3 coaches being overturned down a 10-ft. embankment. Two trainmen and one passenger injured.

And 17 others on 17 roads, involving 5 passenger and 12 freight trains.

DEFECTS OF EQUIPMENT.

8th, on Quincy, Omaha & Kansas City, near Edina, Mo., 8 cars and the caboose of a freight train were derailed and damaged by the breaking of an axle. The caboose was thrown down an embankment, where it caught fire and was burned up. Several passengers in the caboose were injured.

8th, on New York Central & Hudson River, near Newark, N. Y., 6 cars of passenger train derailed by a broken wheel under the tender.

9th, on Denver & Rio Grande, at Florence Station, Col., a car of a freight train was derailed by a defective truck and thrown against a car on a side track, upon which some men were engaged in loading machinery, killing one of them.

10th, on Georgia Pacific, near Day's Gap, Ala., a wheel under the tender of a freight train broke on a trestle. The 3 forward cars were derailed and thrown off the structure, several bents of which were badly damaged. Two trainmen injured.

15th, on St. Louis, Iron Mountain & Southern, near Olyphant, Ark., 8 cars of a freight train derailed and wrecked by the breaking of a wheel flange.

And 12 others on 9 roads, involving 1 passenger and 11 freight trains.

NEGLIGENCE IN OPERATING.

4th, night, at the junction of the West Jersey and the Atlantic City roads, in Camden, N. J., a passenger train was thrown from the track by a derailing switch which a signalman, who had been asleep, misplaced in front of the approaching train. The engine was overturned and the cars were thrown about so as to block both roads. The conductor, who was riding on the engine, was caught by the cars in leaping from the cab and killed.

4th, on Atlantic & Danville, near Danville, Va., several cars of a freight train were derailed and wrecked by some ties slipping off a flat car and falling upon the track. A brakeman was killed.

13th, on Toledo, Peoria & Western, at Mapleton, Ill., freight train derailed and wrecked by a misplaced switch, killing engineer and brakeman.

16th, on Southern Pacific, near Albany, Or., 3 cars of a freight train broke through a bridge which was undergoing repairs. The engineer claims that after seeing the warning signal, which had been set out by the bridge gang, he was unable to stop the train in season.

17th, on San Francisco & North Pacific Coast, near San Francisco, Cal., 2 cars of a switching freight were backed into an open draw into the bay and submerged.

21st, on Denver & Rio Grande, near Burnham, Col., 3 cars of a freight train were derailed and one end of a tank car badly damaged by the sudden application of the air brakes to prevent running over a wagon containing a picnic party at a road crossing.

29th, on Atchison, Topeka & Santa Fe, near Las Vegas, N. M., freight train was derailed by a misplaced switch, wrecking engine and forward end of the train. A brakeman was injured and a man in charge of freight in the train was killed.

And 7 others on 7 roads, involving 3 passenger and 5 freight trains.

UNFORESEEN OBSTRUCTIONS.

11th, on Central of New Jersey, near Bethlehem, Pa., a fast eastbound mail train was derailed by pieces of timber, which had fallen from a passing freight train. The engine was overturned down an embankment and wrecked. Two trainmen injured.

11th, on Northern Pacific, near Painted Rock, Mont., a freight train ran into a landslide, wrecking engine and 4 cars. Fireman killed.

11th, on Baltimore & Ohio, near Harrisonburg, Va., a passenger train hauled by 3 engines was derailed in a snowdrift, the locomotives being badly damaged. Six trainmen injured.

19th, at the crossing near Anniston, Ala., an Alabama mineral freight train ran over a cow and a number of cars were derailed at the crossing of the Georgia Pacific, and afterwards run into by a freight on that road, doing considerable damage.

19th, on Shenandoah Valley, near Buchanan, Va., a freight train ran into and was derailed by a large boulder rolling down upon the track in front of it, wrecking the engine and 5 cars. The fireman and a brakeman were caught in the wreck and killed; the engineer was hurled into the St. James River, but escaped with slight injury.

20th, on Chicago, Burlington & Northern, near Worthington, Minn., a passenger train ran over some cattle and the entire train, except the engine, was overturned into the ditch, injuring 4 passengers.

20th, on Louisville, New Orleans & Texas, near Woodville, Miss., a pay train was derailed at a point where a rail had been loosened by a man who intended to rob the pay car. Three trainmen were injured. The criminal was caught by a detective who was on the train.

21st, on Union Pacific, near Holmesville, Neb., passenger train derailed by an obstruction which had been maliciously placed upon the track at a curve, overturning the engine and baggage car. An employe of the road riding on the locomotive was killed and the engineer seriously injured.

And 7 others on 7 roads, involving 4 passenger and 3 freight trains.

UNEXPLAINED.

3d, 7 p. m., on New York, New Haven & Hartford, near Fairfield, Conn., 2 cars of a freight train were derailed on a bridge, one of them being thrown off the bridge and down 25 ft. into a creek, and the other across the opposite track in front of an approaching passenger train. The speed of the latter was fortunately slackened so that the damage was slight.

8th, on Missouri Pacific, near Oak Chatham, Neb., coal train derailed and 13 cars ditched, injuring engineer and brakeman.

8th, on Missouri, Kansas & Texas, near Alkire, Tex., passenger train derailed and several cars overturned into the ditch. Fire broke out, doing some damage. Four trainmen and 2 passengers injured.

11th, on New York, Lake Erie & Western, near Owego, N. Y., a mail car of a passenger train was derailed and ran over the ties for a long distance, when it went into

the ditch, dragging with it the baggage and express cars. Two trainmen injured.

11th, on Union Pacific, near Hot Springs, Idaho, a construction train derailed, injuring 3 trainmen.

12th, on East Tennessee, Virginia & Georgia, near Howell, Ga., a freight train was derailed on a curve, and all the cars but one overturned down an embankment. Engineer and brakeman killed and fireman badly injured.

13th, on Richmond & Danville, near Laurens, S. C., a construction train heavily laden with rails and cross ties was derailed on a descending grade, and the greater portion of it badly wrecked. Three trainmen and one other employee killed and 4 employees injured.

13th, on Pennsylvania, near Waterford, Pa., a west-bound freight train was derailed and badly wrecked. Engineer, fireman and a brakeman were injured by jumping, the latter fatally.

16th, on Cleveland & Canton, near Chagrin Falls, O., freight train derailed, wrecking engine and 5 cars. Engineer and fireman injured, the latter seriously.

19th, on Alabama Midland, near Ramer, Ala., 2 cars of a freight train derailed, injuring a brakeman.

23d, on Western New York & Pennsylvania, near Watsonville, Pa., a passenger train derailed and baggage car and 2 coaches thrown off a 10-ft. trestle, injuring conductor and 14 passengers.

23d, on Baltimore & Ohio, near New Vienna, O., freight train derailed, wrecking 18 cars and killing 2 tramps.

23d, on Missouri, Kansas & Texas, near Denison, Tex., engine and several cars of freight train derailed and wrecked, badly injuring a fireman.

23d, on Port Townsend Southern, about 14 miles from Port Townsend, Wash., a mixed train was derailed at a point where the roadbed had been impaired by a freshet, 2 freight cars and the caboose going over a high embankment, injuring a brakeman. The train had been stopped and the passenger cars emptied before the dangerous point was reached.

25th, on Spartanburg, Union & Columbia, near Union, S. C., freight train derailed by a switch which had been purposely misplaced, wrecking an engine and 7 cars. A brakeman was injured.

And 25 others on 22 roads, involving 9 passenger and 16 freight trains.

OTHER ACCIDENTS.

8th, on New York, Lake Erie & Western, at Dale, N. Y., locomotive of a fast Lehigh Valley freight train exploded its boiler, portions of it being hurled a distance of over 200 ft. Engineer and fireman killed, and 2 trainmen and a brakeman badly injured.

9th, on New York, New Haven & Hartford, at Wallingford, Conn., engine of freight train exploded its boiler, injuring the engineer and fireman. The sand-box was blown high in the air, and in its descent crashed through the roof of an adjoining dwelling. The engine was about 30 years old.

16th, night, on Texas & Pacific, near Bunkie, La., some cotton in a freight train was discovered to be on fire. It being impossible to extinguish the flames, the two rear cars were detached and the train proceeded. It had not gone far before two more were found burning, and they were likewise cut off and stopped on the main track. Soon after fire was discovered in three flat cars near the front of the train and as a result the cars had to be left at four different places. The engine went to the nearest station for help, but 7 car-loads were burned up and a dwelling damaged by the flames.

17th, on Annapolis, Washington & Baltimore, near Best Station, Md., a car of a passenger train was discovered to be on fire, having been ignited by the car stove.

20th, 3 a. m., on Chicago & Grand Trunk, at Nichols, Mich., a heater in a first-class coach of a passenger train burst, scattering burning coals, which badly damaged the interior of the car and some of the passengers' effects. Two passengers jumped through the windows and were severely cut, and three others were burned.

28th, on Baltimore & Ohio, near Tiffin, O., driving wheel of locomotive of a passenger train broke, badly wrecking one side of the engine.

And 8 others on 7 roads, involving 7 passenger and 1 freight train.

A summary of these and other accidents will be found in another column.

TECHNICAL.

Manufacturing and Business.

The Chicago Railway Appliance Co. and the Western Railway Appliance Co. have opened offices at 360 Rookery Building, Chicago. These offices will be in charge of Mr. W. A. Stevens, who was formerly Chief Clerk to the Superintendent of the Car Department of the Chicago & Northwestern. In these offices will be placed models of the various appliances sold by these companies, and which are now ready for sale in the open market, having been under development for the past year. All of these appliances have been thoroughly tested in actual service, and have been brought to a point where they are considered to be practically perfect. Among the appliances which these companies sell are the following: The Chicago Automatic steel drawbar for passenger and freight service. This M. C. B. drawbar is made entirely of steel, and weighs 185 lbs. complete, including all parts. It is sold for the same price as the malleable iron couplers, and has a tensile strength of 140,000 lbs., which is up to the point of bending the pivotal pin. The ultimate strength of the heads and knuckles is unknown, as the limit of strength is found in the resistance of the pivotal pin. The piston travel indicator, which is extensively used on several roads. Its use materially reduces the labor of car inspectors, and assists in the proper maintenance of air brakes on passenger and freight trains, preventing any possibility of the air piston bottoming in the cylinder. The buffer spring releasing device for passenger cars, which makes the Miller hook safe and efficient coupling, and allows it to be uncoupled on any curve where desired. Also there is an improved draft rigging, which has been developed by actual service on the Chicago & Northwestern road, and several other devices which are yet in the experimental stage, but which have considerable promise.

The Butler Drawbar Attachment Co., of Cleveland, O., has received orders very recently to put its drawbar equipment on all the new cars for the Macon Construction Co., amounting to nearly 2,000; the new cars for the East Tennessee, Virginia & Georgia, and also for several lots of cars ranging from 300 to 500 in number.

The Garlock Packing Co., of Palmyra, N. Y., has just established a fourth factory at Omaha, Neb., which will manufacture goods for the territory west of the Mississippi River. The other factories of the company are at Palmyra, Rome, Ga., and Hamilton, Ont.

The Yale & Towne Manufacturing Co., Stamford, Conn., has begun the issue of a monthly sheet with the title, *Hoisting*. The first number is dated January, 1891. It is devoted more particularly to improved devices for handling materials, and is intended as an exponent of applied mechanics. This issue is devoted to a description of the Weston differential pulley blocks.

The new factory of the Ryan-McDonald Manufacturing Co., which has been erected during the past year at South Baltimore, Md., began running this week. Most of the machinery is new and the new shop will give the firm increased facilities so that it will be better prepared to attend to orders promptly. These works will supplant those at Waterloo, N. Y., as the main factory. The present office of the company is 44 South Baltimore.

The new smelter building of the New Jersey Zinc & Iron Co., at Newark, N. J., is now being built by the Berlin Iron Bridge Co. from its own designs. The building is 52 ft. wide \times 216 ft. long, and entirely fire proof.

The Pittsburgh Reduction Co., of Pittsburgh, manufacturers of aluminum, have cast two cylinders of aluminum bronze to be used in testing that material with reference to its fitness for making guns to throw projectiles filled with explosives. The cylinders are $8\frac{1}{2}$ in. long, with a bore of $1\frac{1}{2}$ in., and the walls are 2 in. thick.

The Westinghouse air brake is to be applied to all trains on the Mexican (Vera Cruz) road.

Iron and Steel.

The Napier Iron Company, of Henryville, Tenn., has awarded the contract to Stein & Schwarze, of Philadelphia, Pa., for erecting a 12 \times 60 ft. blast furnace.

The Southern Malleable Iron Works, Chattanooga, Tenn., is nearing completion. The company expects to have the foundry in running condition in a few days. The President and General Manager of the company is Charles Heron, and P. A. Browner is Secretary and Treasurer.

The Lloyd-Booth Co., of Youngstown, O., has closed a contract with the Philadelphia Iron & Steel Co., to build a 22-inch train, including rolls for cold rolling sheet iron.

An application has been made for the appointment of a receiver for the firm of McLanahan, Smith & Co., operating the Juniata Rolling Mills, at Hollidaysburg, Pa.

At a meeting of the stockholders of the North Carolina Steel & Iron Co., at Greensboro, N. C., the directors were authorized to proceed with the erection of a 120-ton coke iron blast furnace at that point.

Progress of the Pintsch System in Three Years.

Two weeks ago we published an item concerning the progress made in the application of the Pintsch system of lighting cars by compressed gas. At our request the company has given us the following statement of the growth of the system in the United States under the present management:

In 1888 only four railroads in this country were using the Pintsch system, and only 427 cars were equipped, in addition to which the Pullman Palace Car Co. and the Wagner Palace Car Co. had four cars each equipped. There were only six Pintsch gas works in the United States, viz., at Hoboken, Weehawken, Syracuse, Marion, O., Stonington, Conn., and Jersey City. At the present time 29 different railroad companies are using the system on nearly 2,000 cars, while the Pullman and Wagner Palace Car companies have over 350 palace and sleeping cars supplied with it. There are now 14 Pintsch gas works in active operation: at Boston, New York, Jersey City, Weehawken, Stonington, Hoboken, Syracuse, Marion, Chicago, Denver, Ogden, St. Louis, Cincinnati and Atlanta. Negotiations have been completed with the Chicago & North Western for equipping that system, and a gas works is being erected at Chicago for that road, while arrangements are well advanced for the erection of works at Savannah, Chattanooga, Kansas City, Council Bluffs, St. Paul, Louisville, New Orleans and Oakland for the use of railroads centering at these points. These, when completed, will enable all the prominent lines in this country to use this light at less cost than kerosene oil.

Fast Tunneling.

The Zig-Zag tunnel, 1,627 ft. long, on the New York, Ontario & Western Railway near North Walton, N. Y., has just been driven through. The records of 306 ft. in October and 345 ft. in November, 1890—10 \times 20 ft. heading—have seldom if ever been equaled. The November run of 345 ft. is the greatest on record in America. Three drills were used, two of them being of the new "Sergeant" pattern, made by the Ingersoll Sergeant Drill Co. H. R. Wheeler, formerly of the Croton aqueduct, was engineer in charge of this tunnel.

New Machine Shops.

The Kansas City, Memphis & Birmingham will probably erect this year repair shops at Amory, Miss. The land has already been purchased. The shops will be used for rebuilding and repairing, and it is expected that the cost will be \$60,000, including the tools. The company also needs shops for rebuilding its locomotives, but it is not thought that such shops will be erected this year.

The Heating Apparatus of the Cylindrical Steel Car.

The description of this car printed in our issue of Jan. 16 is corrected as regards the heating arrangement. We are told that the commingler system of the Consolidated Car Heating Company is used, as is also the Sewall coupling made by the same company, and not the hot air plan with two furnaces under the car, as was stated.

Infringement Suit.

The Consolidated Car-heating Co. has entered suit against the Martin Anti-Fire Car-Heater Co. for infringement of patents covering piping in cars, and has asked for an injunction to prevent future use and that damages may be awarded for past infringement. The Consolidated Car-Heating Co. owns the Cody patent of Oct. 27, 1885.

Wet Steam.

The *Engineer* of Jan. 9 contains a very satisfactory editorial on problems in steam engineering, from which we quote the following with reference to information available regarding steam engines and the effect of water in the steam used: "It is, we think, highly desirable now that particulars should be collected and published of all cases where a high economical result has been got, showing what was the condition of the steam used. If it can be proved, as we believe it can, that

dryness of steam is a most potent factor in promoting economy, an important step will have been made; because, although superheating has not been found practicable, there need be little difficulty in producing dry steam, either, for example, on Wethered's system, namely, by mixing a small quantity of steam gas at a very high temperature with ordinary steam, or by other means. It is difficult, indeed, to imagine a simpler method of promoting economy than improving the quality of steam supplied to the engine. The gist of our contention is, we may say in conclusion, that many problems in steam engineering are to be solved by ascertaining how much water was in the steam used during the experiment."

Lake Superior Iron Ore for 1890.

The *Marine Review*, of Cleveland, gives the total shipments from the Lake Superior mines as 9,038,939 gross tons. Of this 681,158 tons went to the furnaces, as all-rail shipments. This output exceeds that of 1889 by 1,746,185 tons, or an increase of nearly 24 per cent. The Marquette range, producing 3,028,902 tons, still holds the lead.

The shipments by ranges were as below:

	All-rail.	Total.
Marquette	270,864	3,028,902
Menominee	117,064	2,282,237
Gogebic	292,233	2,847,786
Vermilion	1,000	880,014
	681,158	9,038,939

The shipments by ports were as follows:

From	Gross tons.
Escanaba	3,778,209
Marquette	1,251,531
St. Ignace	21,501
Gladstone	91,095
Ashland	1,618,296
Two Harbors	880,014
All rail	681,158
	9,038,939

Escanaba is claimed as the largest shipping port in the world. The heaviest producers are, with the ranges in which they are located, and their production for last year:

Mine.	Range.	Output.
Norrie	Gogebic	906,728
Chapin	Menominee	742,843
Minnesota	Vermilion	532,000
Ashland	Gogebic	435,949
Chandler	Vermilion	336,002
Cleveland	Marquette	331,713
Lake Superior	Marquette	318,321

Ninety-six mines in all contributed to the year's aggregate, viz.: 35 in the Marquette range, 32 in the Menominee, 26 in the Gogebic, and 3 in the Vermilion range.

THE SCRAP HEAP.

Notes.

The Missouri, Kansas & Texas hospital at Sedalia, Mo., was burned Jan. 20, and the 40 patients were rescued with difficulty.

The Savannah & Western has adopted the compressed air train signal for use on passenger trains in place of the bell rope. A Birmingham paper states that all the roads entering that city now use this signal.

The Scotch railroad strike is reported as failed, but acts of violence still continue. The North British Railway has attached the funds of the Scotch Railway Servants' Society, claiming £20,000 damages from the society for causing the present strike.

The "Soo Line" roads have issued a circular to telegraph operators and agents requesting those who belong to the Order of Railroad Telegraphers either to withdraw from that organization and sign an agreement to that effect or resign their positions.

Trains of the Chicago & Erie, which were considerably interrupted by the strike of the dispatchers and conductors, were resumed on Jan. 25. The reports indicate that the strikers based their action to a considerable extent upon the fear that the company intended to discharge a large number of old employees, and that they did not insist on the retention of Scott, the dispatcher who gave a dangerous train order. The company retracted its decision to take back none of the striking dispatchers, and allowed all but Scott to resume work.

Foreign Notes.

According to the Berlin, Germany, *Tageblatt*, the pneumatic tube despatch system in that city has recently been extended by 9 kilometer (about 5.6 miles), and now embraces altogether 68 kilometers (about 24.2 miles), with 44 stations.

Medals for the Explorers of the Colorado Canon.

At a meeting of the directors of the Denver, Colorado Canon & Pacific Railroad a gold medal was voted to each of the surveyors of the Grand Canon of the Colorado. On one side were the words: "Denver, Colorado Canon & Pacific Railroad, Presented by H. B. Chamberlin, President." In the centre is the name of the recipient, and upon the reverse side, "Exploration and Survey of the Canon of the Colorado, 1889-90." Medals were given to R. B. Stanton, Chief Engineer; John Heslop, Assistant Engineer; R. Francis, Langdon, Gibson, W. H. Edwards, H. L. Ballard, Elmer Kane.

Accompanying each medal was a letter from the President of the company expressing the regard in which the surveyor is held.

Well Stated.

In the case of Philip Carpenter, who sued the New York, New Haven & Hartford to recover \$40 stolen from him in a sleeping car, Chief Judge Follett, of the New York State Court of Appeals, states the measure of the obligation of railroad companies running sleeping cars as follows:

"A corporation engaged in running sleeping coaches with sections separated from the aisle only by curtains is bound to have an employee charged with the duty of carefully and continually watching the interior of the car while berths are occupied by sleepers. These cars are used by both sexes of all ages, by the experienced and inexperienced, by the honest and dishonest, which is understood by the carriers, and though such com-

panies are not insurers, they must exercise vigilance to protect their sleeping customers from robbery. A traveler who pays for a berth is invited, and has the right, to sleep, and both parties to the contract know that he is to become powerless to defend his property from thieves or his person from insult, and the company is bound to use a degree of care commensurate with the danger to which passengers are exposed. Considering the compensation received for such services and the hazards to which unguarded and sleeping travelers are exposed, this rule of diligence is not too onerous."

The Brownsville Train Wreck and Robbery.

The reports of the wrecking of a passenger train on the Rio Grande Railroad, near Brownsville, Tex., on Jan. 19, which appeared highly sensational when first published, seem from subsequent accounts to be substantially correct. This road runs from Brownsville to the seacoast, about 20 miles, and apparently takes all the traffic from that town which is to go by the Gulf and ocean steamers. There were 15 masked robbers, and they derailed the train after daylight in the morning. They removed the fastenings from a rail and then attached a rope to it, which was pulled, by men hidden in the bushes, just before the engine reached it. The engineer and fireman were badly injured in the derailment, but the robbers left them to suffer, while they locked up the passengers in a freight car and proceeded to rifle the valuables in the express and mail cars. There was considerable silver on the train, the amount being variously stated as high as \$30,000. The passengers were robbed of their money and watches. It is supposed that the robbers have fled to Mexico.

LOCOMOTIVE BUILDING.

The New York, Providence & Boston has lately ordered three locomotives from the Rhode Island Locomotive Works.

The Brooks Locomotive Works have sent West two heavy eight-wheel passenger engines for the Illinois Central part of its order for 25. Six engines were completed and shipped from these works last week.

The Buffalo, Rochester & Pittsburgh received this week six new locomotives from the Baldwin Locomotive Works.

Probably about 30 locomotives will be built by the southwest lines of the Pennsylvania this year.

CAR BUILDING.

The Central of New Jersey has invited bids from several car firms for building 400 freight cars.

The Illinois Central is in the market for additional passenger equipment.

The Chicago & West Michigan will soon place orders for 15 passenger cars.

The Muskegon Car Co., Muskegon, Mich., has filed a chattel mortgage on its property aggregating \$67,000 to secure creditors. The works are temporarily idle. It is proposed to reorganize the company with a capital stock of \$500,000, and resume operations.

BRIDGE BUILDING.

Atlanta, Ga.—The city council committee on bridges will soon ask for proposals for building an iron bridge over Forsyth street.

Braddock, Pa.—A bridge over the Monongahela River connecting the steel mills of Carnegie, Phipps & Co., at Homestead, with the furnaces and steel-rail mills at Braddock, Pa., has been commenced.

Bridgewater, Va.—The contract for the bridge over the Dry River has been let to the Wrought Iron Bridge Co., Canton, O., for \$3,200, exclusive of abutments.

Crossville, Tenn.—The Genesis & Obed River road proposes to erect two iron bridges near this town, one at Gun Gap to cost \$15,000 and the other at Daddy's Creek, to cost \$10,000.

Cumberland, W. Va.—The Youngstown Bridge Co. will build a large double track bridge for the West Virginia Central at Cumberland.

McKeesport, Pa.—The contract for building the Port- view bridge over the Youghiogeny River at McKeesport has been awarded to the Oliver Iron & Steel Co. of Pittsburgh and Charles Jutte & Co. The contract for constructing the iron work amounts to \$24,000 and for building the approaches and piers, \$22,000.

Philadelphia.—A sub-committee of City Councils' Committee on Surveys has recommended that \$30,000 be set aside for the bridge on Girard avenue, over the Philadelphia & Reading, provided the railroad company pays a like amount and that \$45,000 be used to construct a new bridge on Kensington avenue, over Frankford Creek. A proposition of the Pennsylvania Railroad Co. to build four bridges on the line between Frankford and Tacony, at an expense of \$200,000, to avoid grade crossings, provided the city would change the street grades, at a cost of \$35,000, was referred to the general committee.

Pittsburgh, Pa.—A charter has been issued to the Aspinwall Bridge Co., of Pittsburgh, for a bridge over the Allegheny River from Aspinwall to Pittsburgh. The directors are B. L. Wood, Jr., S. C. Weiskopf, H. E. Weiskopf and E. K. Morse, of Pittsburgh.

St. Louis.—The City Council has passed an ordinance authorizing the erection of a new bridge across the River Des Peres at Knox avenue.

Sheboygan, Wis.—Proposals are wanted by the city comptroller for the superstructure and substructure of a steel swing bridge over the Sheboygan River.

Suspension Bridge, N. Y.—L. L. Buck, of New York, has prepared plans for the building of a stone arch bridge adjacent to the present railroad suspension bridge, to be used for freight purposes, leaving the present structure for the use of passenger trains only. These plans have been adopted by the Grand Trunk.

Western New York.—The Western New York & Pennsylvania has recently been making changes in its bridges, and during the coming year will erect several. The Union Bridge Co. is now finishing four bridges; one at Arcade of 118 $\frac{1}{2}$ ft. span, one at Portville of 65 $\frac{1}{2}$ ft. span, one at Cady's of 102 $\frac{1}{2}$ ft. span, and one at Allegany with two spans aggregating 332 ft. Tenders have been

invited for four more iron bridges. One at Tuttletown on the Pittsburgh division with four spans aggregating 634 ft., one at Mount Morris of three spans aggregating 441 ft., and two at Shippensburg, one having a span of 90 ft., the other of 103 ft. All of these bridges will replace wooden structures.

RAILROAD LAW—NOTES OF DECISIONS.

Powers, Liabilities and Regulation of Railroads.

In Ohio, the Supreme Court holds that a mortgage given by a railroad company to secure the payment of dividends to the holders of certificates purporting to be certificates of preferred stock is an incident to the principal obligation; and the terms and purport of the certificates express the real intent of the parties, even though some of the stipulations of the mortgage may be apparently inconsistent with the intent as expressed by the certificates.¹

In the Federal Court an intervenor in proceedings to foreclose a railroad mortgage was the owner of cars in hands of the company under a car trust lease which served to it a right to reclaim its property upon default in payment of rent. Upon the appointment of a receiver, the company being then in default, it petitioned the court and demanded of the receiver that its cars be returned within thirty days. They were not returned, but were continuously used by the receiver without objection of the bondholders or trustee, and payments were made on the rental by the application thereto of the freight earned by transportation for the petitioner. After a lapse of three months, intervenor filed a second petition, stating the facts and asking that the receiver be directed to pay the amount due under the car trust contract, and that the same be declared a prior lien upon the earnings as well as on the property embraced in the mortgages. The court holds that the retention and use of the cars by the receiver and the non-action of the bondholders did not amount to a conversion; that the petitioner was not entitled to payment of the rental according to the terms of the car trust lease out of the *corpus* of the estate, but only to a return of the cars within a reasonable time if so demanded, and a *quoniam meruit* for the use thereof.²

In Wisconsin, a donation of land by a county to a railroad company in aid of the construction of its road is absolutely void, though authorized by the legislature.³

In New York it is held by the Court of Appeals that a provision in a railroad company's articles of association, that the total length of the road "and its branches" shall be 35 miles, is not evidence that its main route exceeds 15 miles; and, in the absence of other proof, a reduction of the directors from 13 to 7 in number, under Laws N.Y., 1864, c. 582, sec. 3, authorizing such action by "any railroad company whose main route does not exceed 15 miles," is valid.⁴

In Rhode Island the legislature authorized a city to grant to certain railroad companies the right and privilege of establishing a depot on lands covered by the public waters, and to build the necessary embankments. The Supreme Court holds that permission granted by the city to a railroad company under its charter, and not under the statute, to locate and construct a railroad in the city on condition that it would fill in a certain area of cove lands within a certain time, and to build railroad buildings on the land so filled, was not a grant of the lands for the railroad purposes, but only an easement or permission to occupy the land if it should be filled within the time limited.⁵

In Oregon the Supreme Court rules that a railroad by complying with the act of Congress of 1875 granting rights of way through the public lands under certain conditions, does not acquire a right of way through the homestead claim of a settler, who before that time had settled on such land, and filed a homestead claim, as required by law.⁶

In Washington a statute provided that "all railroad companies owning or operating lines of railway within the territory of Washington shall be liable to the owners of all live stock . . . killed or maimed by their passing trains." Section 8 reads: "No railroad company shall be liable for stock killed upon their roads when the same is fenced by such company with a good lawful fence." The Supreme Court rules that, as there is no law making it the duty of a railway company to maintain a fence, the enforcement of this act would in many cases exact a penalty from one guilty of no fault, which would result in taking property without due process of law; and the act, therefore, is unconstitutional.⁷

In the Supreme Court of the United States it is held that where land is conveyed to a railroad company by a city on condition that the terminus, principal offices and machine shops of the railroad shall be located there, and the deed contains no covenant that they shall be continued for any expressed period, though the contract pursuant to which the conveyance was made provided for their "permanent" location, the condition is complied with as soon as the railroad company locates such terminal appurtenances on the land, and the removal of some of them eight years later is not a breach of the contract.⁸

In New York the Court of Appeals holds that under the General railroad act of 1850 which provides that no one shall be a director of a railroad company unless he is a stockholder, a director who sells all his stock and is thereafter superseded at a special stockholders' meeting held pursuant to notice, ceases to be a director either *de jure* or *de facto*, though the by-laws provide that directors shall be elected at the regular annual meeting.⁹

Carriage of Goods and Injuries to Property.

In the Federal Court, in an action for negligently handling cattle, it appeared that the cattle had been driven over 100 miles before they were shipped; that they were in poor condition, very wild, and hard to get on the cars; that some of them got down and were injured before they had been carried any considerable distance, and that they were loaded on the cars by plaintiff. The court held that the damage resulted from the condition of the cattle, and defendant was not liable.¹⁰

In Illinois the Supreme Court rules that a common carrier cannot by contract limit its liability for delay in transporting goods, during transportation caused by its gross negligence.¹¹

In Iowa it is held by the Supreme Court that in a suit for damages caused to a carload of onions by delay in transporting them 64 miles, the fact that four days were consumed therein was sufficient to justify a finding of negligence, when there was no evidence as to the number of transfers necessary.¹²

In the Federal Court it is laid down that in an action for injuries to cattle in a collision, by reason of which numerous cows miscarried and suffered impairment of their breeding capacity, defendant's liability for damages for its negligence is not lessened by the fact that it received no notice from plaintiffs that the cattle received

for shipment were intended for breeding purposes; especially where it knew that they had been imported from Europe, and were being shipped westward, away from the markets for beef cattle.¹³

In Alabama it is held by the Supreme Court that where a bridge maintained by a railroad company as an approach to a crossing is reasonably safe and convenient for the use of the traveling public, the company is not responsible for an injury sustained by the stepping of plaintiff's mule through a hole which is near one end of the bridge, and out of the usual route of travel.¹⁴

In Minnesota, the Supreme Court rules that where a fire is kindled by sparks from a locomotive, a presumption of negligence arises, which may be met and overcome by satisfactory proof that the engine was properly constructed and managed, and in suitable repair; and, if the uncontradicted evidence on the part of the railway company shows that it has fully performed its duty in these respects, the presumption of negligence is rebutted, and evidence of negligence other than the bare fact that the fire was set by the engine is necessary, in order to warrant a verdict for plaintiff in an action for damages caused by the fire.¹⁵

In Iowa the Supreme Court holds that the owner of lands, by persistently keeping open a gate through which stock escapes, may release the railroad company from liability; and a tenant who has the right to use such lands jointly with the owner has no greater right than he.¹⁶

In Oregon, in an action against a railroad for killing plaintiff's sheep, it was shown that the herder who had them in charge drove them to water, and left them for the night in a narrow space between the river and the railroad track, on the opposite side of which was their feeding ground. In the morning, while he was occupied about other things, they sought their pasture, and, in crossing the track, were killed by a passing train. The Supreme Court holds that the negligence of the herder was the proximate cause of the injury, and plaintiff cannot recover.¹⁷

In Iowa the Supreme Court rules that where a rail road negligently permits its cattle guards at a highway crossing to become and remain full of snow it is liable, as for a failure to maintain such guards, under a statute providing that a railway company shall be liable for all damages sustained by reason of neglect or refusal to do so, and the injured party shall recover on proving such neglect or refusal.¹⁸

Injuries to Passengers, Employes and Strangers.

In the Federal Court it is ruled that if a cable car company procured the best grip it knew of after due investigation and subjected it to the best tests known and thoroughly examined all the machinery of its cars each night by competent men, it is not liable for an injury occasioned by the breaking of the shank of the grip from some latent defect, causing the car to run rapidly down hill and collide with another car, it having diligently applied all known brakes to hold the car on the hill.¹⁹

In Georgia, the plaintiff started into another car to get water while the train was moving slowly, but stopped a minute on the platform to talk, and, just as he was passing on, the coupling pin broke and the cars parted, throwing him off. The Supreme Court rules that the passenger was not guilty of contributory negligence.²⁰

In Pennsylvania the Supreme Court rules that under a statute which provides that, when any person shall be killed or injured while lawfully employed on or about the roads, depots and premises of a railroad company, the right of action against the company shall be the same as if he were an employe, the parents of a man employed by contractors to work on a railroad cannot recover against the railroad company for his death caused by negligence of its servants.²¹

In Tennessee a construction company engaged in building a railroad made a subcontract for the construction of the road from a given point as far as the company's chief engineer might determine, the company to furnish a locomotive and train, with engineer, fireman and brakeman, for the use of the subcontractors in such work. The Supreme Court rules that, while engaged in such work, the subcontractors were independent contractors for whose negligence in the management of the train the company was not liable.²²

In Kansas it is ruled by the Supreme Court that in an action against a railroad company for injuries to an employe operating a derrick by reason of the burning and breaking of the brake rope, where the evidence is conflicting, and the jury find that the rope would not have burned had it been kept wet, but that plaintiff did not know that it was dangerous to use it without wetting it, and that the foreman in charge of the work did not order him to wet it, a judgment for plaintiff will not be disturbed.²³

In Georgia the Supreme Court decides that the rules of a railway company for the government of its employes are not obligatory as such upon those who are not aware of them, and to whom they have not been promulgated.²⁴

In Missouri the Supreme Court rules that the failure of a railroad to have a flagman stationed at a public crossing in a city, as required by its ordinance, is negligence *per se*.²⁵

In Illinois it is held by the Supreme Court that where several parallel tracks belonging to different railroad companies cross a street, the passing of a train on one track is no notice that another train is approaching on a different track.²⁶

In Tennessee the postmaster and express agent at a station on defendant's railroad was killed by an engine running ahead of the express train, and on the same schedule, at about 30 miles an hour. At that point all persons having business with trains were obliged to cross the track in front of them. The view of the track was obstructed. Deceased, supposing that the train which struck him was the regular train, and would stop, attempted to cross the track. Deceased was a prudent man, and the engineer was very reckless. The Supreme Court holds the railroad liable.²⁷

In New York, while driving across a railroad track, plaintiff was struck by a passing train. The track was visible for a long distance at several points before reaching the crossing, and although both plaintiff and the driver were familiar with the surroundings, neither of them looked or listened for approaching trains. The Court of Appeals rules that plaintiff was guilty of contributory negligence, which was emphasized by the fact that the top of the buggy, wind and snow rendered it more difficult to hear the noise of an approaching train.²⁸

In Michigan a woman was killed at a crossing. The fireman testified that he saw her, when about 50 feet from the track, when she was "slashing" the horse with the lines, as if trying to cross ahead of the train, and he immediately notified the engineer, who applied

the air brakes, and stopped the train about 40 feet beyond the crossing. The Supreme Court holds that the railroad was not responsible.²⁹

¹ Miller v. Ratterman, 24 N. E. Rep., 496.

² Farmers' Loan and Trust Co. v. Chicago & A. R. Co., 42 Fed. Rep. 6.

³ Ellis v. Northern Pac. R. Co., 45 N. W. Rep., 811.

⁴ Beardsley v. Johnson, 24 N. E. Rep., 380.

⁵ New York & N. E. R. Co. v. City of Providence (R. I.), 19 Atl. Rep., 759.

⁶ Larsen v. Oregon Ry. & Nav. Co., 23 Pac. Rep., 974.

⁷ O. R. & Nav. Co. v. Sinalley, 23 Pac. Rep., 10.

⁸ Texas & P. Ry. Co. v. City of Marshall, 10 S. Ct., Rep., 846.

⁹ Beardsley v. Johnson, 2 N. E. Rep., 380.

¹⁰ Missouri Pac. Ry. Co. v. Texas & P. Ry. Co., 41 Fed. Rep., 913.

¹¹ Chicago & N. W. Ry. Co. v. Chapman, 24 N. E. Rep., 417.

¹² St. Clair v. Chicago, B. & Q. Ry. Co., 45 N. W. Rep., 570.

¹³ Estill v. New York, L. E. & W. R. Co., 41 Fed. Rep., 549.

¹⁴ Patterson v. South & North Ala. R. Co. (Ala.), 7 South Rep., 437.

¹⁵ Daly v. Chicago, M. & St. P. Ry. Co., 55 N. W. Rep., 611.

¹⁶ Mannell v. Burlington, C. R. & N. W. Co., 45 N. W. Rep., 568.

¹⁷ Keeney v. Oregon Ry. & Nav. Co., 24 Pac. Rep., 233.

¹⁸ Giger v. Chicago & N. W. Ry. Co., 45 N. W. Rep., 906.

¹⁹ arter v. Kansas City Cable H. Co., 42 Fed. Rep., 37.

²⁰ Cottrell v. S. & T. R. Co., 11 S. E. Rep., 553.

²¹ Fleming v. Pennsylvania R. Co., 19 Atl. Rep., 740.

²² Powell v. Va. Const. Co., 13 S. W. Rep., 691.

²³ Union Pac. Ry. Co. v. Fray, 23 Pac. Rep., 1039.

²⁴ Central R. R. of Georgia v. Ryals, 11 S. E. Rep., 499.

²⁵ Murray v. Missouri Pac. Ry. Co., 13 S. W. Rep., 817.

²⁶ Chicago, M. & St. P. Ry. Co. v. Wilson, 24 N. E. Rep., 555.

²⁷ C. O. & S. W. R. Co. v. Hendricks, 13 S. W. Rep., 696.

²⁸ Brickell v. New York Cent. & H. R. R. Co., 24 N. E. Rep., 440.

²⁹ Underhill v. C. & G. R. T. Co., 45 N. W. Rep., 508.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

New York, Chicago & St. Louis, 3½ per cent. on the first preferred stock, payable March 2.

Sandusky, Mansfield & Newark, 3½ per cent., payable Feb. 1.

Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Allegheny & Kinzua, annual, Olean, N. Y., Feb. 10.

Bay of Quinte Railway & Navigation Co., annual, Deseronto, Ont., Feb. 2.

Camden & Atlantic, annual, Cooper Point, Camden, N. J., Feb. 26.

Chicago Belt, special, Chicago, Ill., Feb. 24, for the purpose of making a new lease with the Chicago & Western Indiana.

Chicago & Western Indiana, special, Chicago, Ill., Feb. 24, to consider proposed improvements.

Chippewa Valley, annual, Mount Pleasant, Mich., Feb. 18.

Delaware, Lackawanna & Western, annual, 26 Exchange Place, New York City, Feb. 24.

Fort Wayne & Jackson, annual, Jackson, Mich., Feb. 5.

Grand Rapids & Indiana, annual, Grand Rapids, Mich., March 4.

Huntington & Broad Top Mountain, annual, American Life Bldg., Philadelphia, Pa., Feb. 3.

Kansas City, Memphis & Birmingham, annual, Memphis, Tenn., Feb. 4.

Kansas City, Wyandotte & Northwestern, annual, Kansas City, Mo., Feb. 4.

Keokuk & Western, annual, Keokuk, Ia., Feb. 4.

Kingston & Pembroke, annual, Kingston, Ont., Feb. 11.

New York, Susquehanna & Western, annual, Taylor's Hotel, Jersey City, N. J., Feb. 26.

Northern Central, annual, Baltimore, Md., Feb. 26.

Philadelphia & Erie, annual, Philadelphia, Pa., Feb. 9.

Scioto Valley & New England, annual, Columbus, O., Feb. 12.

Summit Branch, annual, 233 South Fourth street, Philadelphia, Pa., Feb. 10.

Toledo & Ohio Central, special, Toledo, O., Feb. 18, to consider a proposed increase of the capital stock.

Western Counties, annual, Yarmouth, N. S., Feb. 11.

Wheeling & Lake Erie, annual, Toledo, O., Feb. 3.

Wood Mountain & Qu'Appelle, annual, Winnipeg, Man., Feb. 4.

Railroad and Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The New England Railroad Club meets at its rooms in the United States Hotel, Beach street, Boston, on the second Wednesday of each month, except June, July, and August.

The Western Railway Club holds regular meetings on the third Tuesday in each month, except June, July and August, at the rooms of the Central Traffic Association in the Rookery Building, Chicago, at 2 p. m.

The New York Railroad Club meets at its rooms, in the Gilsey House, New York City, at 2 p. m., on the third Thursday in each month.

The Central Railway Club meets at the Hotel Iroquois, Buffalo, the fourth Wednesday of January, March, May, September and November.

The Northwest Railroad Club meets on the first Saturday of each month, except June, July and August, in the St. Paul Union Station at 7:30 p. m.

The Northwestern Track and Bridge Association meets on the Friday following the second Wednesday of each month at 7:30 p. m. in the directors' room of the St. Paul Union station, except in the months of July and August.

The American Society of Civil Engineers holds its regular meetings on the first and third Wednesday in each month, at the House of the Society, 127 East Twenty-third street, New York.

The Boston Society of Civil Engineers holds its regular meetings at the American House, Boston, at 7:30 p. m., on the third Wednesday in each month.

The Western Society of Engineers holds its regular meetings at 78 La Salle street, Chicago, at 8 p. m., on the first Wednesday in each month.

The Engineers' Club of St. Louis holds regular meetings in the club's room, Laclede Building, corner Fourth and Olive streets, St. Louis, on the first and third Wednesdays in each month.

The Engineers' Club of Philadelphia holds regular meetings at the House of the Club, 1122 Girard street, Philadelphia, on the first and third Saturday of each month, excepting in January, when the annual meeting is held on the second Saturday of the month. The second January meeting is held on the third Saturday. The club stands adjourned during the months of July, August and September.

The Engineers' Society of Western Pennsylvania holds

regular meetings on the third Tuesday in each month, at 7:30 p. m., at its rooms in the Penn Building, Pittsburgh, Pa.

The Engineers' Club of Cincinnati holds its regular meetings at 8 p. m. on the third Thursday of each month in the rooms of the Literary Club, No. 24 West Fourth street, Cincinnati.

The Civil Engineers' Club of Cleveland holds regular meetings on the second Tuesday of each month, at 8:00 p. m., in the Case Library Building, Cleveland. Semi-monthly meetings are held on the fourth Tuesday of the month.

The Engineers' Club of Kansas City meets in Room 200, Baird Building, Kansas City, Mo., on the second Monday in each month.

The Engineering Association of the Southwest generally holds its meetings at the Association headquarters, Nos. 63 and 64 Baxter Court, Nashville, Tenn.

The Denver Society of Civil Engineers and Architects holds regular meetings at 30 Jacobson Block, Denver, on the second and fourth Tuesday of each month, at 8 o'clock p. m., except during June, July and August, when they are held on the second Tuesday only.

The Civil Engineers' Society of St. Paul meets at St. Paul, Minn., on the first Monday in each month.

The Montana Society of Civil Engineers meets at Helena, Mont., at 7:30 p. m., on the third Saturday in each month.

The Civil Engineers' Association of Kansas holds regular meetings at Wichita on the second Wednesday of each month, at 7:30 p. m.

The American Society of Swedish Engineers holds meetings at the club house, 250 Union street, Brooklyn, N. Y., and at 347 North Ninth street, Philadelphia, on the first Saturday of each month.

Boston Society of Civil Engineers.

A regular meeting was held at the American House, Boston, Jan. 21, Vice-President W. E. McClintock in the chair and 53 members and visitors present. Mr. Gilbert Hodges, of Medford, was elected to membership. A committee, consisting of Desmond Fitz Gerald, L. B. Bidwell, J. A. Gould, Dwight Porter and H. L. Eaton, was appointed to nominate officers for the coming year.

Mr. F. P. Johnson, of Waltham, exhibited and explained some devices for carrying on survey work with rapidity. Among others he showed a transit rod, with wire-leg tripod attachment for use on frozen ground or on a point coming on a ledge or large stone. He also showed a combined leveling, stadia and transit rod which had some novel and interesting points.

Mr. Lawrence Bradford gave an account of a trip on the upper Missouri River and described the means used to increase its channel to a minimum depth of 3 ft.

PERSONAL.

—Mr. George Morris, General Manager of the A. French Spring Co., leaves this week for Barbadoes to spend a vacation "far from the madding crowd."

—Mr. Thomas Campbell, of Longview, has been appointed one of the Receivers of the International & Great Northern to fill the vacancy caused by the death of Col. Eddy.

—Mr. F. W. D. Holbrook, lately manager of the Seattle, Lake Shore & Eastern, has accepted a position as Secretary of the new Board of Public Works of Seattle, Wash.

—Mr. Charles R. Whitman is the successor of Mr. John T. Rich as commissioner of railroads for the State of Michigan. He has qualified and has assumed the duties of the position. Mr. W. C. Ransom is retained as Deputy Commissioner.

—Mr. W. N. Bannard, Superintendent of the Amboy Division of the Pennsylvania Railroad, has been appointed Superintendent of the Altoona Division, with headquarters at Altoona. Frank Ellmaker, of the Sunbury Division, succeeds Mr. Bannard as Superintendent of the Amboy Division.

—Gen. Michael B. Hewson, who has resided for the past two years in Washington, died last week in that city of Bright's disease. Gen. Hewson was Chief Engineer of the Mississippi & Tennessee when that road was being constructed, and also Chief Engineer during the construction of the Mississippi levees.

—Mr. John B. Campbell, who has been connected with the Manhattan (Elevated) for the last three years as Superintendent of Transportation, has been appointed Assistant Superintendent of Motive Power of the New York Central & Hudson River road. Mr. Campbell had charge of the Manhattan repair shops at 90th street, on the Third avenue line, and was previously connected with the Central of New Jersey.

—Mr. A. D. McLeod, Assistant General Freight Agent of the Cleveland, Cincinnati, Chicago & St. Louis at Sandusky, O., in charge of the Cincinnati, Sandusky & Cleveland road, has resigned, as has also Mr. W. R. Baldwin, Assistant General Passenger Agent of the Sandusky division. Mr. McLeod was General Freight Agent of the Cincinnati, Sandusky & Cleveland, and Mr. Baldwin, General Passenger Agent, before the road was leased.

—Maj. Peyton Randolph, General Manager of the Richmond & Danville, has been elected Third Vice-President. Major Randolph has been General Manager of the road since the resignation of Mr. E. B. Thomas. Capt. W. H. Green, Assistant General Manager, has been appointed General Manager. Capt. Green has had a long experience on the Richmond & Danville in various positions. He was Assistant Superintendent for several years and later General Superintendent.

ELECTIONS AND APPOINTMENTS.

Boston, Albany & Schenectady.—At the annual meeting last week the following were elected directors: John W. Van Valkenburgh, Joseph H. Ramsey and Joseph Walter, of Albany, N. Y.; Samuel B. Reed, William S. Carman, William B. Carman, Louis E. Carman, Howard Allison and William S. MacKellar, of New York; S. A. Rockefellow, of Brooklyn, and Frederick Miles, of Copake, N. Y. John W. Van Valkenburgh was elected President; James Parks, Vice-President, and Samuel B. Reed, Secretary and Treasurer.

Buffalo, Rochester & Pittsburgh.—Joseph P. Thompson, General Freight and Passenger Agent, has been granted leave of absence. The duties of his office have been temporarily assigned to Robert W. Davis, with the title of Acting General Freight Agent, and E. C. Lapey, with the title of Acting General Passenger Agent.

Burnside & Cumberland River.—The following officers have been elected by this company, operating a two-mile road in Kentucky: President and General Manager, C. W. Cole; Vice-President, Oliver Kinsey; Secretary, M. F. Molloy, and A. B. Massey, Superintendent, all with offices in the Chamber of Commerce building, Cincinnati. J. W. Gunn, Lexington, Ky., is Chief Engineer.

Chicago, Rock Island & Pacific.—H. C. Chapman, Assistant Eastern Passenger Agent in New York City for the last eight years, has been transferred to Colorado Springs, Col., at his own request, and will act as General Agent at that point.

Chicago, St. Paul & Kansas City.—James S. Smith has been appointed New England Passenger Agent of this company, with headquarters at 106 Washington Street, Boston, Mass., vice C. A. Baldwin, resigned to engage in other business.

Cleveland, Lorain & Wheeling.—At a meeting of the board of directors of the company held last week Edwin R. Perkins was elected President to succeed the late Selah Chamberlain and A. S. Gorham of New York city was chosen a director.

Columbus & Southern.—This road having been secured by the Georgia Midland & Gulf, G. Gunby Jordan has been appointed General Manager, in place of Samuel F. Parrot, resigned. The following appointments are also announced, the officers holding similar positions on the Georgia Midland & Gulf: General Freight and Passenger Agent, Clifton Jones; Superintendent, M. E. Grey; Master Mechanic, J. D. McPhail.

Coudersport & Port Allegany.—The annual meeting was held at Port Allegheny, Pa., recently. The following officers were elected: President, F. W. Knox; Vice-President, C. S. Cary; Superintendent, B. A. McClure; Treasurer, W. V. Jones; Secretary, A. B. Mann; Directors, F. H. Root, A. G. Olmstead, Isaac Benon, B. D. Hamlin, C. S. Cary, F. H. Arnold, J. L. Knox, R. L. Nichols.

Delaware River & Lancaster.—At the annual meeting of the stockholders at Lancaster, Pa., the following Board of Directors was elected: Austin Gallagher, New York; Robert Crane, A. M. Zane, Philadelphia; William A. Morton, Dr. R. M. Boleni, Lancaster; Thomas Briggs, Newton, Pa.; Henry W. Watson and John O. Keim, Philadelphia; George Crane, Columbia. The Board organized by electing Robert Crane President; Austin Gallagher, Vice-President; George A. Seales, of New York, Treasurer; I. W. Guidin, Reading, Secretary.

Duluth, Huron & Denver.—At the annual meeting at Sauk Center, Minn., the following officers were elected: Thomas Bates, President; A. P. Brudo, Vice-President; A. H. Evans, Secretary and Treasurer; M. D. Dean, W. T. Stewart, Frank Upham, W. J. Canfield, Charles Fish and George Fish, Directors.

Duluth, St. Cloud, Mankato & Southern.—At the stockholders' meeting held in St. Cloud, Minn., the following directors were elected for the ensuing year: H. C. Waite, J. E. Hayward, John Cooper, D. E. Myers, F. H. Darm, C. L. Atwood, St. Cloud; Erastus Cross, Sauk Rapids; W. H. Greenleaf, Litchfield; J. A. Willard, Charles Bennett, G. T. Barr, Mankato; John Murphy, Henry Foster, St. Hilaire; H. H. Corson, New Richland; D. B. Smith, G. Schindler, Austin, and C. Cunningham, Elmo City. John Cooper was elected President, E. Cross, Vice-President; George T. Barr, Secretary, and P. H. Corson, Treasurer.

Eastern Minnesota.—W. S. Alexander has been appointed President, and will also assume the duties of General Manager and Traffic Manager.

Joliet, Lisbon & Western.—The incorporators of this Illinois company are: W. S. Wiese and Levi Platt, of Plattsburgh; James Johnson, E. S. Holland, N. Nelson, J. L. Kelsey, A. Gunsel, Edwin S. Fletcher, Joseph Marwick, Peter Morrison, John Moore, Daniel Hill and Austin Osman, of Lisbon, Ill., and F. L. Stephen, of Newark, Ill.

Lake Ontario & Sault Ste. Marie.—The promoters of the road have appointed the following provisional officers: John Burnham, F. C., President; Thos. Cahill, Vice-President; R. A. Morrow, Treasurer; E. H. D. Hall, Secretary; James Stevenson, M. P., J. R. Stratton, M. P. P., John Burnham, Q. C., T. Cahill, R. A. Morrow, W. H. Moore, R. S. Davidson and E. H. D. Hall, Directors; Hall & Hayes, Peterboro, Ont., solicitors.

Louisville Southern Railroad.—The lessee company, the East Tennessee, Virginia & Georgia, has appointed the following named officers, with headquarters at Cincinnati: R. Carroll, General Manager, vice W. B. Woodard, resigned; D. Miller, Traffic Manager; C. H. Davis, Comptroller, vice A. H. Ford, resigned; H. H. Tatem, Treasurer, vice A. H. Ford, resigned; G. B. Nicholson, Chief Engineer; R. W. Healy, Purchasing Agent, vice H. V. Harris, resigned; R. X. Ryan, General Freight Agent; D. G. Edwards, General Passenger and Ticket Agent, vice B. W. Wren, resigned, and A. V. Lafayette, Division Freight Agent, Louisville, Ky.

Manhattan (Elevated).—S. D. Smith, Train Master of the Third Avenue line, has been appointed Superintendent of Transportation, vice J. D. Campbell, who has resigned his position to accept service elsewhere.

Mexican National Construction Co..—Arthur P. Herbert has been appointed Engineer and Superintendent of the Colima Division of this company, with headquarters at Colima, Mex.

week, and resulted in the election of the following board: Thomas P. Fowler, Joseph Price, Samuel Barton, Francis E. Culbert, John Greenough, Richard Irvin, William H. Paulding, H. Pearson, Albert S. Roe, Charles J. Russell, R. K. Sibley and Charles S. Whelen. The only change was the substitution of Mr. Kerr in place of Julian L. Myers, who resigned. The directors organized by re-electing Thomas P. Fowler, President; Joseph Price, Vice-President; John B. Kerr, Vice-President and General Counsel, and R. D. Rickard, Secretary and Treasurer. J. R. Childs was reappointed General Manager.

Ontario, Carbondale & Scranton.—The stockholders have elected Thomas P. Fowler, William H. Richmond, C. D. Simpson, John Jermyn, O. S. Johnson, W. Patterson, John B. Kerr, Daniel Scurry, C. E. Spencer, James E. Childs and James E. Burr, directors. E. B. Sturges was chosen President, James E. Childs, General Manager, and John Fleming, Secretary and Treasurer.

Pacific Short Line.—C. L. Scrags has been appointed General Freight and Passenger Agent of the line, with headquarters at Sioux City, Ia., vice George W. Hibbard resigned to become Commercial Agent of the Mexican National, with office at Laredo, Tex.

Pennsylvania.—W. N. Bannard, Superintendent of the Amboy Division, has been appointed Superintendent of the Altoona Division, with headquarters at Altoona, Pa. Frank Ellmaker, the Superintendent of the Sunbury Division has been appointed to the position made vacant by Mr. Bannard's removal.

Philadelphia & Reading.—The following appointments have been made: C. E. Metzler, Assistant Superintendent, with his office at No. 411 North Thirteenth street, Philadelphia, vice M. E. Blaine, who is appointed Train Master.

Rumford Falls & Buckfield.—The directors of the road met in Portland, Me., last week and organized by the choice of the old board of officers, as follows: President, Hon. William L. Putnam; Superintendent, L. L. Lincoln; Clerk and Treasurer, R. R. Bradford.

Sandusky, Mansfield & Newark.—The annual meeting was held recently and the following directors were elected: John Gardner, President; Jay O. Moss, Vice-President and Treasurer, L. J. Tracy, E. G. Gardener, C. H. Moss, Charles F. Mayer, Robert Garrett, A. C. Moss and Clarke Rude.

San Francisco & North Pacific.—The following directors and officers were elected at the annual meeting of the company, held in San Francisco, Cal., Jan. 20: Directors: J. F. Burgin, P. N. Lilienthal, Peter J. McGlynn, Charles F. Hanlon, Alfred L. Seligman, Russell J. Wilson and Henry T. Scott. Officers: J. F. Burgin, President; P. N. Lilienthal, Vice-President; H. C. Whiting, General Manager; Alfred L. Seligman, Treasurer, and Thomas Mellersh, Secretary and Auditor.

Saratoga & St. Lawrence.—At the annual meeting of the company following were elected directors: S. W. Forster, J. Gregory Smith, E. C. Smith, E. G. Reynolds, Thomas Cantwell, F. D. Kilburn, T. A. Sears, Frank Shields, W. B. Babcock, Louis Hasbrouck, F. W. Baldwin, Frank Owen and S. W. Cummings.

Sinnemahoning Valley.—G. T. Johnson, late foreman of the Delaware, Lackawanna & Western in Buffalo, has been appointed Master Mechanic of this road.

Syracuse & Baldwinsville.—The new directors are: Wallace C. Andrews, William A. Cauldwell, Richard A. Dorman, of New York; Thomas F. Goodrich and Charles D. Marvin, of Brooklyn; George S. Coe, Jr., of Englewood, N. J., and Floyd F. Bently, of Baldwinsville, N. Y.

Union Pacific, Denver & Gulf.—Granville M. Dodge has been elected President of the road to succeed Charles Francis Adams, who placed his resignation in the hands of the directors at the time he retired from the Presidency of the Union Pacific.

Union Pacific.—It is reported that the present organization of the mechanical department is as indicated here: J. H. McConnell, lately Master Mechanic of the North Platte Division, to be Superintendent of Motive Power, with office at Omaha, Neb., to succeed Harvey Middleton. F. Mertsheimer, Superintendent of the Wyoming Division, appointed Assistant General Master Mechanic, with office at Cheyenne, Wyo.

The following officials of the passenger department have been appointed: T. W. Lee, Assistant General Passenger Agent, Portland, Or.; W. H. Hurlbut, General Agent, San Francisco; D. E. Bunley, General Agent, Salt Lake; George Ady, General Agent, Denver; T. B. Frawley, General Agent, Kansas City; S. M. Adsit, General Agent, St. Joseph; D. M. Collins, General Agent, Sioux City.

C. E. Wurtele has been reappointed Superintendent of the Wyoming Division of the Union Pacific, with office at Cheyenne, Wyo.

Edward Canfield has been appointed Assistant Treasurer, with office in New York.

Union Stock Yards & Transit Co.—The annual meeting of the stockholders was held in Chicago, Jan. 22. The following directors were elected: M. Thayer, Boston; John Newell, John B. Sherman, Marvin Hubbard, John N. McCullough, J. C. McMullen, R. R. Cable, George B. Harris, John C. Wellin, Roswell Miller and Frederic H. Winston.

Utica & Mohawk.—The annual meeting of the stockholders of the road was held recently and the following directors re-elected: James F. Mann, F. W. Sherman, William E. Lewis, George D. Dimon, W. T. Baker, A. D. Barber, T. R. Proctor, George H. Wiley, P. C. J. DeAngelis, W. M. White, M. W. VanAuken, R. G. Hoerlein and J. Morris Childs.

West Virginia Central.—The stockholders of the road held their annual meeting in Piedmont, W. Va., Jan. 28, and elected the following Board of Directors: Henry G. Davis, R. C. Kerens, John A. Hambleton, Stephen B. Elkins, James G. Blaine and W. H. Taylor. The directors re-elected the following officers: Henry G. Davis, President; S. B. Elkins, Vice-President; Major E. L. W. Moore, Secretary; C. L. Bretz, General Manager.

RAILROAD CONSTRUCTION. Incorporations, Surveys Etc.

Albany, Florida & Northern.—Part of the rolling stock has arrived and the construction work is so far advanced that it is expected to open the road next week from Albany to Cordele, Ga., 35 miles.

Brierfield, Blockton & Birmingham.—The trains of the East Tennessee, Virginia & Georgia will be running into Birmingham this week over this road from Montevallo. The work in the cut at Gentry's Gap, a few miles north of Gurnee, has delayed the opening of the line several months. The Blockton branch from Montevallo through Gurnee to Blockton is 33 miles long, and has been in operation since August. The Bessemer division just completed extends from Gurnee north to Bessemer, 17 miles. Between Bessemer and Birmingham, 12 miles, trains will run over the Alabama Great Southern. The surfacing and ballasting on the Bessemer division is being done by R. T. Martin & Co., of Atlanta, Ga.

Brunswick, Altamaha & Northern.—The charter for this company was issued at Atlanta last week, the certificate of organization having been previously filed. The company is not a new one. It proposes to build a road from Brunswick, Ga., to a point in McIntosh County, about 35 miles distant. The capital stock is \$150,000.

Burlington & Missouri River.—The track on the extension of the Grand Island & Wyoming Central has been laid to Deadwood, S. D., and trains will begin running to that town this or next week.

Columbus & Kootenai.—The track on this branch of the Canadian Pacific has been laid to a point about three miles north of Nelson, B. C., its southern terminus. The distance from Sproat's Landing is 28 miles. The rains have greatly interfered with the work and in many places the roadbed has been entirely washed away, so that several months' work will have to be done in the spring before the road can be operated. Many of the timber trestles have also been destroyed.

Danville & East Tennessee.—The company will award on Feb. 1 the first contract for grading on the line from Bristol, Tenn., east to Damascus, Washington County, Va. This section will be about 27 miles long.

Great Northern.—The contract for building 55 miles of the road between Bonner's Ferry and Kootenai Falls, Wash., has been let to Burns & Chapman, of Spokane Falls, Wash.

Kansas City, Nevada & Fort Smith.—The company is now running its trains from Amoret, Mo., north through the easterly counties of Missouri to Kansas City. A connection is made with the Kansas City Suburban Belt Line at Brush Creek, and trains run from that point to the station at Second street, near the foot of Wyandotte street. The first through passenger train was run Jan. 21. The company uses its own track between Grand View and Amoret, 45 miles, and the track of the Kansas City & Southern from Grand View north to Brush Creek, 24 miles. The road is built to reach the coal mines at Amoret and several branches have already been built from that point to coal mines in the vicinity.

Joliet, Lisbon & Western.—This company was incorporated in Illinois last week with a capital stock of \$500,000. The road is to be built from Joliet to the Fox or Illinois rivers in La Salle County, Ill.

Macon & Birmingham.—The surfacing between Macon and La Grange, Ga., 97 miles, was completed last week, and the passenger train service has been extended to La Grange, 30 miles beyond Woodbury, which has been the terminus for some months.

Macon & Dublin.—The Illinois & Georgia Improvement Co., of Chicago, which is the construction company building this line, has the track laid for a distance of 12 miles east of Macon, Ga. There is little further grading to be done on the line between Macon & Dublin, 54 miles, and the officers of the construction company claim that all the track between these points will be laid in a short while, and that whether the Macon & Atlantic is built or not they will have trains running on this road in a few months. They deny that the road has been sold to the Macon & Atlantic Construction Co., which is building the Macon & Atlantic railroad.

Nashville, Chattanooga & St. Louis.—Construction trains on the extension of the Sequatchie branch are running as far as Pikeville, Tenn., 20 miles north of Dunlap. The ballasting is now being done and passenger trains will be running as soon as it is finished. A survey has been made for a further extension of the branch from Pikeville, 15 miles northeast to the head of the Sequatchie Valley and thence to Crossville on the Lebanon branch of the same road.

It seems to be still undecided what route to adopt between the Tennessee River and the connection with the Huntsville division for the extension of the Tennessee & Coosa. It is reported that the engineers are to begin another new survey between Guntersville and Huntsville, and when they have completed their work it will no doubt be decided whether to connect with the Huntsville division at Bell Factory as the officers now propose, or at Huntsville, a much more important town. The track on the extension of Tennessee & Coosa is now laid from Attalla to Guntersville, Ala., on the Tennessee River. The contractors have suspended work until spring, when it will be decided what route to build on north of Guntersville.

Nashville & Cumberland Gap.—Officers of the Nashville, Chattanooga & St. Louis made application at Nashville, Tenn., last week for a charter for this road, which is to extend from a point on that road easterly toward Cumberland Gap.

New Roads.—The Jacksonville Mining & Mfg. Co. proposes to build a road from its steel works at Jacksonville, Ala. (or Tredegar), to the mineral lands of the company, about eight miles distant. The grading is to begin at once.

A survey has been recently made by Frank Balch, of Kalamazoo, Mich., for a proposed road from that point southwest to Marcellus, a distance of 21 miles. The road is projected to give Kalamazoo a connection with the Chicago & Grand Trunk, which will be done if a line is built to Marcellus.

A belt line is proposed at Minneapolis, Minn. The yards of most of the roads entering the city are widely separated, and a great deal of switching of cars has to be done via roundabout routes between the different lines. It is not expected that there will be any difficulty in obtaining the franchise from the city government.

A survey has been made for a road eight or 10 miles long from Caledonia, Livingston County, south to salt mines at Griesville, near Pittard, N. Y. The road will connect the salt mines with several of the trunk lines in New York state.

Northern Pacific.—The track on the Green River & Northern branch is now laid to Williams Creek, about 7½ miles north of Durham, Wash., where the branch connects with the main line. Little work has been done on the line for some months, but it is now proposed to resume work and lay the track at once to Nidlock, 18 miles north of Durham, and which will be the present terminus.

Oregon & Washington Territory.—The Northern Pacific asserts that it has a claim for \$300,000 against this company and last week it served out an attachment against George W. Hunt, the President, who is also building the various extensions. The attachment was issued against the division being built from Centralia west to Gray's Harbor, Wash., which parallels one of the new branches of the Northern Pacific.

Orlando & Oakland.—The company has been organized at Orlando, Fla., to build a road from Orlando to Oakland, Fla. Mahlon Gore, Orlando, is President.

Pennsboro, Auburn & Glenville.—A notice of the incorporation of this company in West Virginia was printed Jan. 16. The correct terminal points of the line will be a point in Ritchie County, near Goosenek, and Glenville in Gilmer County. The distance between the two points is about 30 miles. Part of the line has been surveyed in a general southwesterly direction through Ritchie County. The road will practically be an extension of the Pennsboro & Harrisville road. M. P. Kimball, Pennsboro, W. Va., is President.

Philadelphia & Reading.—The first passenger train on the extension of the Northeast Pennsylvania began running from Hartsville to New Hope, Pa., on the Delaware River, 16 miles, last week. All the track was laid before Jan. 1.

Port Townsend Southern.—Most of the towns which have granted subsidies to this road have agreed to extend the time limit in which the road was to be completed. If all the subsidies are extended the officers state that grading and tracklaying will be resumed at once. The few miles still remaining to be built to reach Quicene, Wash., the northern terminus of Hoods Canal, will be completed, and also the section from Olympia north to Union City, the southern terminus of the canal. Boats will run on Hoods Canal, between these two towns, making a line from Port Townsend to Olympia.

Quebec & Boston Air Line.—The directors of this line have arranged to transfer the company's franchises and other property to the Boston & Maine, which, it is reported, has agreed to undertake the construction of the line from a point in Wolfe County, Quebec, through Megantic and Lotbiniere, to Point Levis, opposite Quebec. Ten miles of the line is already built between Breakeys Mills, in Levis County, and the St. Lawrence River.

Richmond, Nicholasville, Irvine & Beattyville.—This road is now being operated as a division of the Louisville Southern from Versailles southeasterly to Richmond, Ky., a distance of 38 miles. The track has been laid for about three miles further east from Richmond, but work on the extension of the line was suspended some time since by the construction company. New agreements have been made with the railroad company, and it is proposed to again begin tracklaying early in February. If that work is resumed when promised, there is little doubt that the track will be laid to the Kentucky River opposite Irvine, and 23 miles east of Richmond, early in June. Ballasting will also probably be finished by that time, and the line will be ready for operation. A large bridge is being built over the Kentucky River at Irvine. The masonry is now about finished, but the superstructure will hardly be erected before next July.

San Francisco & San Mateo.—The company has been incorporated in California with a capital stock of \$2,000,000, of which \$40,000 has been paid up. The directors are: Behrend Joost, J. H. Gilmore, J. W. Hartzell, Fabian Joost and W. F. Thomas.

San Joaquin Valley.—The company has been incorporated in California by Jacob Eppinger, Barry Baldwin, H. Dutard, James Hogg, B. Ettlinger, James W. Sperry, Richard D. Girvin, George Sperry, I. S. Bostwick, J. D. Peters and A. B. Sperry. Of the capital stock \$5,500 has been subscribed.

Seattle & Northern.—Tracklaying was recently resumed on the extension of this road from the Skagit River easterly to Hamilton, Wash., about seven miles. The line will be put in operation to Hamilton next week. If the Oregon Improvement Co. is released from the control of the Receiver as early as expected and the proposed arrangements for the sale of the bonds of that company are consummated, there is no doubt that a further extension easterly from Hamilton will be undertaken to reach the grain fields of Washington. There is no town in that part of the state which may be designated as the prospective terminus of the line, but work on the extension will be continued in sections as the company receives money from the sale of the bonds issued for this purpose.

South Carolina Roads.—Bills to incorporate the following roads are pending in the state legislature: Anderson & South Port; Lockhart Shoals; Mount Pleasant & Seaview; Western Carolina; Walterboro, Summerville & Otranto, and Savannah, Seneca & Western.

Southern Pacific.—The company has bought the Pomona & Elsinore railroad and will complete it to Chino, Arlington, South Riverside and Temescal, Cal.

South Florida & Georgia.—The engineers of the construction company have run a line from Quitman, Ga., south to Tampa, Fla., 250 miles, and are now making a survey from Tampa north. The return survey will pass through Brookville and Dunnellon, Fla., to a point west of Quitman on the Savannah, Florida & Western.

Spokane Falls & Northern.—Three surveys have been made for the proposed extension from the Columbia River at Marcus west to the mines at Okanagon, Rock Creek and Conconnelly. A route has been selected from one of these, and the company will let contracts and begin the grading before next summer. It is expected to have the extension ready for operation by Oct. 1, 1891.

Tyler & Southwestern.—This company was organized in Texas recently by the officers of the Missouri, Kansas & Texas to operate the road formerly called the Kansas & Gulf Shore Line. That road extends from Tyler to Lufkin, Tex., 95 miles. The capital stock of the new company is \$1,000,000. It is understood that a

large part of the line will be double tracked and that an extension will be built.

Union Pacific.—The extension of the Utah lines from Milford south was graded last year for a distance of about 140 miles to Pioche, Nev. Little track was laid on the line, however, as work was abandoned when a few miles had been laid at Milford. It is now reported that the company proposes to resume tracklaying in March. The track can be laid very soon, as most of the cross ties have been delivered and little repairing will need to be done to the graded roadbed.

Wilmington & Weldon.—The contract was let last week for completing 35 miles of the branch which it is proposed to build from Fayetteville, on this road, southwesterly to Rowland, N. C., the northern terminus of the Florence road, which is also part of the Atlantic Coast Line system.

Woonsocket & Pascoa.—All the track has been laid on this road between Woonsocket and Pascoa, R. I. The road will probably be opened for traffic next week. The erection of the various bridges on the line has delayed the work of construction to a considerable extent.

GENERAL RAILROAD NEWS.

Canadian Government Railroads.—An Ottawa correspondent sends us the following account: When the Intercolonial project was first put forward as part of the general Confederation scheme of the Dominion, its promoters estimated the cost at \$21,000,000. Its construction has already cost \$43,000,000, and the expenditure on construction or "capital" account is still growing. And instead of paying its way, or yielding revenue sufficient to pay interest on the cost of its construction, the expenses of operating the road far exceed its revenues every year. The public accounts for the fiscal year 1889-90 show that last year the total receipts of the Intercolonial were \$2,928,080, while the operating expenses reached \$3,481,472, leaving a deficit on ordinary account of \$553,392; which, added to the payments charged to capital \$405,246, makes the total deficit on the operation of the road line \$918,638. Adding the deficit on the Prince Edward Island last year \$105,514, the operation of these two government roads cost the Canada over \$1,000,000 last year. In the preceding year the ordinary deficit on the Intercolonial was \$258,864, and on the Prince Edward Island road \$76,189. The Eastern Extension road, from New Glasgow to Canso, which was purchased from the Nova Scotia Government for \$1,300,000, earned \$5,556 last year over and above the expenses of operation. Ordinary railroads in Canada, such as the Grand Trunk, the Canada Atlantic, etc., have not only to earn enough to meet the cost of their operation, but to pay interest upon the money used in their construction. But it seems that railroads owned and managed by the government are not expected to earn even enough to cover working expenses. That is the difference between railroads run on business principles and those run to suit political exigencies. In addition to the deficits on the Intercolonial and the amount spent on that road and charged to capital account, the Dominion Government has expended large amounts on the Cape Breton, the Digby & Annapolis, the Carleton branch and the Oxford & New Glasgow.

Delaware & Hudson Canal.—The following is the preliminary statement for the year ending Dec. 31:

	1890.	1889.	1888.
Receipts from coal	\$7,900,206	\$8,652,318	\$10,622,067
Receipts from R. R.	10,468,674	9,426,974	9,554,221
Miscellaneous	911,968	822,300	552,891
Total gross earn.	\$19,180,848	\$18,957,593	\$20,729,189
Oper. expenses	13,101,176	12,992,868	14,044,740
Net earn.	\$6,079,672	\$8,654,725	\$6,684,469
Int., taxes and rentals	3,541,333	3,426,829	3,340,035
Balance	\$2,538,338	\$2,37,895	\$3,344,134

Fitchburg.—The Massachusetts Legislative Railroad Committee gave a hearing in Boston this week on the petition of the company for authority to consolidate with the Monadnock Railroad. The stock of the Monadnock road is owned by the Fitchburg.

Kentucky Union.—A meeting of stockholders will be held in Louisville, Feb. 15, to vote on a refunding scheme by which the present second-mortgage bonds of the company will be taken up and a new issue authorized.

Oswego & Rome.—The Rome, Watertown & Ogdensburg has filed judgments against this company amounting to \$135,710. The judgments were entered by default and were granted because of the non-payment of interest on bonds of the Oswego & Rome since 1872. The latter company has since been absorbed by the Rome, Watertown & Ogdensburg.

Perth Amboy & Woodbridge.—The Perth Amboy & Long Branch has been merged with this company, one of the operated lines of the Pennsylvania and included in the United Railroads of New Jersey Division.

Philadelphia & Reading.—The report of the earnings and expenses for December is as follows:

December:	1890.	1889.	Inc. or dec.
Gross earnings	\$1,686,110	\$1,634,941	I. \$31,169
Operating expenses	986,461	989,441	D. 2,980
Profit in oper.	699,649	665,499	I. 34,150
Net earnings	\$733,355	\$683,262	I. \$50,093
Expn. for perm. imp.	49,783	69,912	D. 20,129
One-twelfth year's fixed charges	614,500	664,283	D. 49,783
Surplus	\$69,072	\$42,756	I. \$26,316

Poughkeepsie Bridge Co.—The company has issued a circular asking the holders of the six per cent. mortgage bonds of the company to sign an agreement for the funding of four coupons (two years' interest) of the bonds, and appointing Charlemagne Tower, Jr., and Arthur Brock, of Philadelphia, members of a committee to arrange the form of funding and to protect the interests of such bondholders as may become parties to the agreement.

Syracuse & Baldwinsville.—New articles of incorporation were filed in the office of the Secretary of State at Albany, N. Y., by the Syracuse & Baldwinsville Railway Co., the purchaser at foreclosure sale of the road between Amboy and Baldwinsville, N. Y.

Texas Central.—The committee of the stockholders of the company give notice that the sale under foreclosure is fixed for March 25, and invite first mortgage seven per cent. bondholders to deposit their bonds and to sign the bondholders' agreement. The agreement provides for the payment of an assessment of \$10 per bond, and

empowers the committee to purchase the railroad for the assenting bondholders, at a price not exceeding the total amount of the principal and interest due or unpaid upon all the bonds. The road runs from Ross to Albany, Tex., 177 miles, and from Garrett to Roberts, 52 miles, a total of 229 miles, and is controlled and operated by the Houston & Texas Central.

TRAFFIC.

Chicago Traffic Matters.

CHICAGO, Jan. 28, 1891.

The Commissioners of the Western Traffic Association are in session this week, arranging the details of the new association. A principal question under consideration is the territorial assignment of traffic which has not heretofore been embraced in any of the existing associations.

The Burlington has notified the committee in charge of the pass agreement that it proposes to withdraw from the agreement so far as it prohibits the granting of transportation to refrigerator car lines, and the committee have authorized a modification of the agreement to that extent. President Manvel, of the Atchison, is on a trip West, and the committee are waiting for his final decision in regard to the notice of withdrawal of the Atchison from the agreement. If he adheres to his intention as announced prior to his departure, the committee will be obliged to release the other lines from the agreement altogether. It is particularly unfortunate that a disagreement on this question should arise at this time when the roads are endeavoring to place the new association on its feet. Forty-eight important roads had signed and were carrying out its provisions, which effected a great reform in the matter of free transportation for the procuring of business, and in all respects limiting it to the legal requirements.

Chairman Midgley of the Western Freight Association, having learned that some of the association lines are applying the old rates on grain from elevators leaving Kansas City after Jan. 15 which started from originating points prior to that date, has notified them that they must charge the advanced rates on such shipments. Continuing, he says:

"Dealers obtained a six months' transit privilege and they desire to have it extended to 12 months. Inasmuch as under the operation of the transit deal there is practically no local grain, there would, under these circumstances, be no likelihood of effecting an advance in rates. In fact it is not apparent how one could be made, operating under the conditions above recited. There must be a date on and after which the advanced rates should be applied on all shipments. The parties are not entitled to protection indefinitely, because our experience is that all manner of evasions are practiced upon us, and the lowest proportions, unless careful watch is kept, are apt to be applied on grain when reshipped. The arrangement as it exists would not, it is believed, stand the test of legal investigation, hence there can be no question as to the right of the carriers to charge and collect the full proportions of the advanced rates on and after notice to that effect."

Minneapolis dispatches announce the indicting of President Egan and General Agent C. H. Holdridge, of the Chicago, St. Paul & Kansas City, for violating the second and third sections of the Interstate Commerce Act in entering into an agreement with Chas. H. Petach, and furnishing him tickets to Chicago and Kansas City at rates much below the tariff rates, as heretofore noted in these columns. No conclusion has been reached in the Minneapolis & St. Louis cases, in which it is charged that a similar contract exists with A. E. Johnson & Co., whereby Messrs. Johnson are enabled to discriminate in favor of foreign passengers as against domestic.

The Central Traffic Association gave notice Jan. 21 that taking effect on legal notice the rates on common or laundry soap in carloads will be reduced to the basis of sixth class between all points in the territory of the association. This action is taken in view of the recent decision of the Interstate Commerce Commission in the Proctor & Gamble case.

The committee having charge of the Chicago-St. Paul passenger traffic has ordered the Wisconsin Central to turn over to the Chicago & Northwestern and Chicago, Burlington & Northern, all eastbound transatlantic traffic until further notice. It has also ordered a diversion of westbound traffic from the St. Paul and Wisconsin Central sufficient to produce a total revenue of \$17,400 divided as follows: To the Chicago, St. Paul & Kansas City, \$3,400; Chicago & Northwestern, \$7,500; Chicago, Burlington & Northern, \$5,000; Albert Lea route, \$1,500.

The item last week concerning rates from Central territory to St. Paul was incomplete. The fact is that the rate via Chicago has always been the sum of the two locals to and from Chicago, but lately a great deal of business has been diverted via Mackinaw and Duluth. For a time the Chicago lines paid no attention to this diversion, but it kept increasing until it absorbed the greater share of the business. The Chicago lines recognized the loss, but could not agree upon divisions. The lines between Chicago and St. Paul demanded their full locals, insisting that the Central Traffic Association lines should bear the full loss on the through rate. The latter, of course, made a similar claim. Thus the matter has rested for some time. A compromise has now been adopted to the effect that the through rate via Chicago shall be the same as via Mackinaw, and that the divisions between the Central Traffic Association lines and their St. Paul connections via Chicago shall be proportional to their average local rates on all classes. The agreement goes into effect Feb. 2.

Some of the southwestern roads are complaining that the Atchison does not comply with the orders for diversion of traffic, but the complaints do not seem to have been loud enough as yet to draw out any order or utterance of any kind from the chairmen in charge of the division.

Traffic Notes.

The Great Northern Railway has dismissed about 20 men from its freight and passenger soliciting offices in Chicago and east of there.

President Depew, of the New York Central, says that the advisory board, appointed by the roads of the Vanderbilt and Pennsylvania systems, has not yet been called together.

Mr. B. F. Knapp, Chief Clerk of the Central Traffic Association, passenger department, is visiting all the principal cities covered by that organization, appointing local committees to carry out the rules and decisions of the main body.

The Flint & Pere Marquette is doing a heavy east and west freight business just now. It has six large freight steamers running across Lake Michigan, three between

Manitowoc and Manistee, and three between Milwaukee and Ludington.

The practical effect of the Interstate Commerce Commission's decision in the laundry soap case is to reduce that commodity from 5th to 6th class, and the Trunk lines and Central Traffic Association roads have placed it in that class throughout their territory.

The congressional committee on interstate commerce has lately heard members of the American Ticket Brokers' Association and the Guarantee Ticket Brokers' Association in opposition to the bill introduced in the house prohibiting the payment of commissions to ticket agents.

Ticket sellers of the Trunk lines are "strictly prohibited from receiving any consideration whatever from other companies in connection with the sale of tickets or the routing of passengers." Receiving pocket knives with engraved handles from old friends is apparently still permitted, as likewise \$5 bills from generous strangers.

The Chicago & Grand Trunk unexpectedly announced on Jan. 22 that its local passenger fares in Michigan would be at once reduced to 2 cents per mile in accordance with the late decision of the Supreme Court of that state. It had been understood that the road would ignore the law and appeal the case to the United States Supreme Court.

The annual report of the St. Louis Union Depot for 1890 shows sales of 515,031 tickets for \$1,424,994, a slight increase over the previous year. The average value of local tickets sold was \$2, and coupon tickets \$9.49. The number of pieces of baggage handled during the year was 852,187, and the amount of excess baggage collection \$48,022. The receipts for baggage storage were \$5,903.

A revised issue of the Official freight classification has been agreed upon by the Joint Committee of the Trunk Line and Central Traffic Associations, and will go into effect Feb. 8. It contains 12 more pages than its predecessor, and the list of articles is increased 500. There are many changes, the most striking one being the addition of milk weed pods. For the benefit of the ignorant it may be stated that floss found on these pods is used in the manufacture of artificial flowers.

Iowa Commissioners Order Additional Trains on the Rock Island.

The Iowa Railroad Commissioners on Jan. 22 rendered a decision on the complaint of inadequate train service on the Chicago, Rock Island & Pacific. They hold that at the present time, in comparison with the ample facilities afforded for the through travel, local travel is unjustly discriminated against and the facilities afforded by the respondent line in Iowa are entirely insufficient and not such as have heretofore been deemed necessary by the company, and voluntarily furnished. It appears reasonable to the commissioners that passenger facilities should be afforded by which the local travel can be carried to the county seats and trade centers during some portion of the forenoon, and returned during some portion of the afternoon. The opinion leaves the details of improving the train service to the company, but at the same time orders an improvement to be made.

Iowa Freight Rates.

The Iowa Railroad Commissioners have sent to all the railroads doing business in the state an order lowering the classification on nearly a hundred important items of freight. The order is to go into effect Feb. 7, and lowers the rate about 25 per cent. on all the articles mentioned.

Decision on Through Rates from Foreign Countries.

The Interstate Commerce Commission has decided the case of the New York Board of Trade and Transportation against the Pennsylvania and 28 other roads, involving questions of discrimination. The complaint was sustained against the Texas & Pacific, the St. Louis, Iron Mountain & Southern, the Louisville, New Orleans & Texas; the Illinois Central, the Wabash, the Southern Pacific, the Union Pacific, the Northern Pacific, the Baltimore & Ohio, the Lehigh Valley, the Canadian Pacific and the Grand Trunk, and each of them was ordered by the Commission forthwith to cease from carrying any article of imported traffic shipped from any foreign port through any port of entry of the United States or any port of entry in a foreign country adjacent to the United States upon through bills of lading, destined to any place within the United States at any other than upon the inland tariff governing other freight at such port of entry to such place of destination, or at any other than the same rates established in such inland tariff for the carriage of other like kind of traffic in the elements of bulk, weight, value and expense of carriage, such order to take effect on and after March 10, 1891. The complaint was not sustained as to the other defendant roads, and as to them it was dismissed. The complaint in these cases was chiefly concerning the low rates charged by the Trunk Lines from the Atlantic seaboard westward on goods coming from Europe.

East-bound Shipments.

The shipments of east-bound freight from Chicago by all the lines for the week ending Saturday, Jan. 24, amounted to 81,661 tons, against 74,810 tons during the preceding week, an increase of 6,851 tons, and against 106,076 tons during the corresponding week of 1890, a decrease of 24,415 tons. The proportions carried by each road were:

	Wk. to Jan 24.		Wk. to Jan. 17.	
	Tons.	P. c.	Tons.	P. c.
Michigan Central	10,211	12.5	9,310	12.5
Wabash	4,044	5.0	5,016	6.8
Lake Shore & Michigan South.	12,885	15.8	13,287	17.7
Pitts., Ft. Wayne & Chicago	9,471	11.5	8,103	10.9
Chicago, St. Louis & Pitts.	8,064	9.9	7,906	10.5
Baltimore & Ohio	6,072	7.4	5,821	7.7
Chicago & Grand Trunk	14,678	17.9	13,116	17.4
New York, Chic. & St. Louis	7,313	10.0	4,986	6.7
Chicago & Erie	8,923	10.0	7,233	9.7
Total	81,661	100.	74,810	100.0

Of the above shipments 5,248 tons were flour, 30,275 tons grain, 4,083 tons millstuffs, 8,526 tons cured meats, 4,317 tons lard, 8,350 tons dressed beef, 1,052 tons butter, 1,581 tons hides, 238 tons wool and 4,790 tons lumber. The three Vanderbilt lines together carried 37.3 per cent., while the two Pennsylvania lines carried but 21.5 per cent.